TH ANNUAL REPORT

THIRTIETH ANNUAL REPOR

ON THE

New York State Museum of Natural History

BY THE

REGENTS OF THE UNIVERSITY

OF THE

STATE OF NEW YORK.

TRANSMITTED TO THE LEGISLATURE APRIL 13, 1877.
STATE MUSEUM EDITION.

JEROME B. PARMENTER, STATE PRINTER.
1879.

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TRANSMIT 13, 1877.

Royal Ontario Museum of Geology

Presented by the heirs of

COL. C. C. GRANT

Hamilton, Ont.

JEROME B. PARMENTER, STATE PRINTER.
1878.

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No. 63.

IN SENATE,

April 13, 1877.

THIRTIETH ANNUAL REPORT

ON THE

STATE MUSEUM OF NATURAL HISTORY, BY THE REGENTS OF THE UNIVERSITY OF THE STATE OF NEW YORK.

UNIVERSITY OF THE STATE OF NEW YORK:
OFFICE OF THE REGENTS,
ALBANY, *April* 13, 1877.

To the Hon. WILLIAM DORSHEIMER, *President of the Senate:*

SIR.—I have the honor to transmit the Thirtieth Annual Report on the State Museum of Natural History, by the Regents of the University.

I remain, very respectfully,
Your obedient servant.
JOHN V. L. PRUYN,
Chancellor of the University.

REGENTS OF THE UNIVERSITY.

[Ex officio Trustees of the State Museum of Natural History.]

JOHN V. L. PRUYN, LL.D., Chancellor.
ERASTUS C. BENEDICT, LL.D., Vice-Chancellor.

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Rev. ORRIS H. WARREN.

SAMUEL B. WOOLWORTH, LL.D., Secretary.
DANIEL J. PRATT, Ph. D., Assistant Secretary.

STANDING COMMITTEE OF THE REGENTS ON THE STATE MUSEUM.

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The SUPT. OF PUB. INSTRUCTION.
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Mr. RANKIN.
Mr. PIERSON.
Mr. BOSTWICK.
Mr. TOWNSEND.

Director of the Museum.

JAMES HALL, LL.D.

Assistants in the Museum.

J. A. LINTNER: Entomology and General Zoölogy.
JAMES W. HALL: Osteology and Preparation of Rock Sections.
R. FRITZ-GAERTNER: Mineralogy.

Botanist.

CHARLES H. PECK.

Taxidermist.

JAMES A. HURST.

REPORT.

To the Honorable the Legislature of the State of New York:

The Regents of the University, as Trustees of the State Museum of Natural History, respectfully submit this their Thirtieth Annual Report.

The reports of the Director and Botanist hereto appended show the progress of the Museum for the last year and its present condition.

Some valuable additions, especially to the Zoölogical collections, have been made. The Mineralogical Department has been re-arranged, the specimens labeled and the collections are well exhibited for the purpose of study.

The minerals of the State are not fully represented and the specimens are not all of the best kinds. The attention of the Director will be given to this subject, and it is hoped that better specimens, of every mineral in the State, will be placed on the shelves of the Museum.

Every part of the Museum is greatly crowded, and scientific arrangement is in some cases necessarily sacrificed to make room for additions. It is respectfully submitted to the Legislature whether some means should not be devised to provide proper accommodations for the growth of the Museum which is consequent on its prosperity.

The work of the botanist has been prosecuted zealously and successfully. A small appropriation is needed to meet the expenses of the botanist in the field.

All of which is respectfully submitted.

By order of the trustees.

JOHN V. L. PRUYN,
Chancellor of the University.

S. B. WOOLWORTH,
Secretary.

ALBANY, *April* 12, 1877.

REPORT

ON THE

STATE MUSEUM OF NATURAL HISTORY.

1877.

CONTENTS.

PAGE.

Report of the Director.. 5

Additions to the State Museum during the year 1876.............................. 13

Report of the Botanist, C. H. Peck.. 23

Lithology of the Adirondacks. By Albert R. Leeds................................ 79

On the Structure of *Astræospongia meniscus.* By Drs. J. W. Hall and R. Fritz-Gaertner.. 111

Entomological Contributions — No. IV. By J. A. Lintner.......................... 117

REPORT OF THE DIRECTOR.

ALBANY, *January* 9, 1877.

To the Honorable the Board of Regents of the University of the State of New York:

GENTLEMEN.—I have the honor to present herewith the Annual Report on the State Museum of Natural History, embracing a statement of the condition of the collections in the several departments, the additions made thereto, and the work done in the institution during the past year, together with special communications.

I am able to report that the collections are in good order and condition, and much progress has been made in the better arrangements of some departments, as will be seen in the statements following. But I am constrained to repeat, what I have so often said before, that a want of space for a proper arrangement of the increasing material in nearly every department becomes more and more embarrassing.

With the liberality always characterizing the Legislature of our State, it last year made the necessary appropriation to secure the purchase of the rhinoceros and giraffe referred to in my preceding report, and to provide for the mounting of the skin and skeleton of the former, and the skin of the latter. The two mounted skins have already been placed in the Museum.

In reference to my special communication of last year, the secretary of the board and the committee on the State Museum, have authorized a change in the arrangement of material upon the upper floor of the Museum, by which the large case, formerly devoted to ethnological and historical collections, has been vacated of these collections, and adapted for the reception of the mounted skins of two specimens of walrus, the rhinoceros and giraffe, the skeleton of the rhinoceros and other objects. The enclosing of an area in the center of the east end of the room, by glass, to correspond with the adjacent cases, has also been authorized by the commissioners of the land office; and thus adequate room has been furnished for the present wants of the Zoölogical collection.

This change will however preclude the full arrangement of the ethnological and historical collections, as the cases which have been or can be vacated will not accommodate the entire collection. A re-arrangement of a part of this however, as hereafter stated, will, in some degree obviate the want of space on the third floor.

Owing to the occupancy of the Agricultural Hall, by the Census Department, since the early part of 1876, no work of actual distribution of duplicate material has been made since January last, but the catalogues were completed as far as the material had been arranged. The collections of fossils have been arranged preparatory to such distribution whenever time and opportunity shall be afforded.

A statement in detail of the additions to the Museum collections will be found appended.

To the Zoölogical Department there have been eight contributors.

To the Botanical Department, fifteen.

To the Geological, Palæontological and Mineralogical Departments, fifteen.

In Archæology and Ethnology, seven.

To the Library, six individuals and seven societies and departments have contributed.

The additions to the Library consist of twenty-two bound volumes (including seven volumes bound for the Museum during the year), twenty-four serials and thirteen pamphlets.

THE GENERAL AND SPECIAL WORK OF THE MUSEUM, during the past year, may be enumerated under the following heads:

In the *Botanical* Department a special report will be presented by Mr. Peck.

In the *Zoölogical* Department, the arrangement of the Molluscan collections has been completed, and the objects named in the list of additions have been properly named and noted. A contribution to the Insect fauna of thirty-seven species is almost the only donation of the kind to the Museum collections.

In the *Geological* and *Palæontological* Departments no collections have been made in the field, but a large number of specimens from collections previously made have been prepared, by careful cleansing, cutting and polishing, or by removing the matrix with acid. These have been prepared for study and illustration in the *Palæontology of New York*, and will form a large and valuable addition to the present arranged collection.

The enlarged figures of characteristic fossils of the formations have been completed during the early part of the year, but owing to the occupation of that floor of the Museum, they have not all been arranged in their places at this date.

An appropriation made by the Legislature provided means for the purchase of a collection of fossils belonging to Mr. C. Callaway, formerly an assistant in the Museum. The collection consists of 800 species represented by 1,100 specimens of British (including a few Italian) fossils, representing the several formations from the lower Palæozoic to the Tertiary inclusive. This will add nearly *six hundred species* not before in the Museum collections. These specimens have been mounted on wooden tablets and labeled, preparatory to incorporation in the series of British and European fossils, whenever some additional table-case room can be provided for their arrangement.

Arrangement of the Mineralogical Collections.

In regard to the *Mineralogical* department, I have heretofore communicated to you the progress made towards a final and satisfactory arrangement of the material in our possession, and I now have the satisfaction to report that the long needed work of the re-arrangement of this collection is virtually completed. During the early part of the year, Mr. C. T. Sheldon, temporarily engaged in the Museum, was employed in the work of copying the labels and placing on the shelves that portion of the collection which had passed under the examination of Prof. Chester and Prof. Root of Hamilton College. In September last the services of Dr. R. Fritz-Gaertner were engaged, and since that time he has been mostly occupied in work upon the Mineralogical collections, for which his knowledge of chemistry and mineralogy has especially qualified him. Both the New York and the General collections have been mounted on wooden tablets ; the specimens numbered, and the number recorded on the labels attached to the tablets. In the New York collection, 1,508 labeled tablets have been arranged. The General collection occupies cases on a portion of the south wall, and the entire west wall of the second floor of the Museum, and will number about 2,000 tablets. In the New York collection, the arrangement adopted by Dr. Beck, in his report on the Mineralogy of the State, has been retained, that it might not conflict seriously with the catalogues which have been published in the annual reports. The General collection has been arranged in accordance with Dana's System of Mineralogy.

In order to facilitate the study of the collections, conspicuous cards, upon which is written the *mineral composition* of each species, have been placed upon the shelves at the left of the first specimen of each, thus serving to show the commencement of each series and the extent of its representation. Subsequent to the arrangement of the general collection, the surplus material has been placed in thirty drawers, as duplicates for distribution and exchange. There have also been selected rock specimens, filling twenty drawers, intended for incorporation in a Lithological series, which is much needed in the Museum, and which it is proposed to arrange.

It may, perhaps, be proper to state in this place, that the New York collection of minerals, as it has existed in the State Museum since its arrangement in the new building in 1857, was made up of the original collections of Dr. Beck, and of the minerals from northern New York which were first arranged by Dr. Emmons as county collections, representing the ores and minerals of the second geological district. This incorporation of the two collections was never made satisfactory to mineralogists nor to any one having a general knowledge of the subject. Species were duplicated, and specimens which had been collected for their geological interest were incorporated in what was intended to be a strictly mineralogical collection. Donations were made from various sources, and these minerals, though extra-limital, were added to the New York collection. In this condition it was found by the present director, and it has always been in contemplation that a proper and scientific disposition should be made of the whole.

Since that time the State has purchased two collections containing minerals, the Simms and Gebhard, and numerous donations have been made. Notably among the latter was the collection of the late Dr. Jeremiah Van Rensselaer, which has added greatly to the extra-limital species. In order to preserve, in each of the departments of the Museum, the evidences of its origin in the *Geological survey of the State*, the director has, to the best of his ability and the means at his disposal, taken care that the original collection of Dr. Beck shall remain, with many additions as representing the mineralogy of the State, according to the intention of that author.

In order, however, to utilize and exhibit the specimens derived from purchase and many donations, the General collection of minerals has been organized, and is now presented in its arranged condition, and disposed in such a manner as to render it accessible and useful to all students in Mineralogy. This collection is still very incomplete, but this plan of double arrangement will permit the incorporation of any specimens or collections which may be acquired, from within or beyond the limits of the State of New York. The arrangement is satisfactory and instructive, and I would beg leave to invite the Committee of the Board of Regents, having charge of the Museum, to examine the Mineralogical collection.

Section preparation of Fossils and Rocks.

In the progress of the Museum work, it has been frequently necessary to cut and polish specimens of fossils, in order to study the organic structure, and to present them in a proper manner for investigation and for arrangement in the collections. Until the past year this work was done at the marble cutting establishments which afforded proper facilities. This mode, however, became too expensive and uncertain as to time, and the requirements of the subjects also demanded that more delicate and perfect adaptations should be at command. It became, therefore, necessary that we should have the means at hand within the Museum building.

In the first place, an ordinary turning lathe, operated by a treadle, was adapted to the requirements of such work, but this was found unsatisfactory, and the labor of cutting large specimens too severe. At the present time, a small steam boiler and the necessary machinery have been adapted to the lathe.

Some time has necessarily been lost in experimenting, and much time has been required in adapting the machinery to the work; but the difficulties seem now to be essentially overcome. Much good work has been done and is now in progress, and is being rapidly accomplished.

I need scarcely speak of the importance and even necessity of such an apparatus in connection with a Museum like that of the State of New York. The study of the microscopic structure of rocks and fossils has, within a few years. become an essential part of the science, and facilities of this kind are required.

Already I have the satisfaction of presenting to you the introductory parts of two papers, by assistants in the Museum, the initiation and completion of which have been and will be greatly dependent upon the study of the microscopic structure of the subjects under investigation. One of these papers is upon the Lithology of the Adirondacks, a subject of great interest and importance to us in New York; and by means of which we may be able to learn the real constitution of our crystalline rocks and to compare with results of similar studies in Europe, where they are now made with great perfection by aid of the microscope.

The other paper is upon the microscopic structure of some examples among the fossil sponges — Petrospongia. The commencement of this paper and the work now in progress at the Museum give promise of a valuable contribution to our knowledge of the intimate structure and relations of these fossil forms. This work absolutely requires the means of cutting, grinding and polishing sections of the fossils.

I hope that the Committee on the State Museum will take the opportunity to satisfy themselves in regard to this additional element of progress in the Museum work.

Arrangement of a Collection of Aboriginal Stone Implements.

The increasing interest manifested in Archæological subjects has lent additional value to the aboriginal remains, which, at a comparatively recent period, abounded in many parts of the country.

The Museum has, for some time, possessed numerous very interesting aboriginal stone implements. In the removal of the

"Historical and Ethnological collection" before referred to, that portion comprising the stone and terra-cotta implements has been withdrawn and arranged as a separate collection in a range of table-cases at the east end of the second floor. The following is the series as displayed in the several cases: Pestles, gouges, axes, hand-axes or chisels, amulets, miscellaneous objects in stone, knives, stone and terra-cotta pipes and fragments, pottery, lances and arrow-heads.

The pestles are illustrated by a fine series, varying in size from five to twenty-three inches in length. Among the axes (over 100 in number), are examples showing much skill in workmanship. The arrow-heads have been grouped so as to show the several materials from which they were made, as quartz, chert, porphyry, obsidian, sandstone, shale, etc. The various forms were doubtless adapted to the purposes for which they were intended, whether for warfare or game of different kinds, ranging from the simple unnotched conical head, to the delicately wrought and artistic barbed form. One example illustrates a form rarely seen, of a beveling of the opposite sides, by means of which rotation is imparted in its flight. Although, from want of case-room, but a portion of this collection is displayed, it very deservingly commands the notice of the visitors of the Museum.

Distribution of Duplicate Fossils and Minerals.

The work of selection, preparation and labeling the duplicates of fossils and minerals of the Museum (the greater portion of which were from the Simms, Gebhard and Van Rensselaer collections), was continued during the month of January, with the entire force of the Museum. But while the work was still only half completed, it became necessary to vacate the room for the occupancy of the Census Bureau.

The distribution of the duplicate collections to the several institutions authorized to receive them, by legislative enactments and by direction of the Board of Regents, has been continued during the year. Collections have been sent to the following institutions:

Rensselaer Polytechnic Institute of Troy, N. Y.
Cornell University, Ithaca.
Syracuse University, Syracuse.

Long Island Historical Society, Brooklyn, L. I.
American Museum of Natural History, New York.
State Normal and Training School, Buffalo.
State Normal and Training School, Geneseo.
State Normal and Training School, Fredonia.
State Normal and Training School, Oswego.
State Normal and Training School, Albany.

In the above collections there are contained, in the aggregate, 2,242 specimens of fossils, 1,172 of minerals, and a total of 3,414.

These are labeled with systematic name, locality when known, together with the rock formation of the fossils.

In presenting my report it is not possible, nor do I regard it as desirable, that all the details of Museum work shall be stated. I would beg leave to ask the attention of the Board of Regents to the evidences of progress in the way of accession and improvement in the condition and arrangement of the collections in the Museum ; and also to the large collections of fossils in process of preparation, at my private working rooms, for arranging in the Museum, or preparatory to distribution, in continuation of what has been already done.

At the present time, the work of the Museum and the study of its collections, with a view to maintain and advance its reputation as a scientific and educational institution, is going on in a much more satisfactory manner than for a long time past. I will conclude by asking your committee, charged with the affairs of the Museum, to give the necessary time to inform themselves fully of every thing connected with its objects and workings, that they may, if necessary or desirable, give such directions as will carry out their views of the proper ordering of the institution.

I am very respectfully,
Your obedient servant.
JAMES HALL,
Director.

ADDITIONS TO THE STATE MUSEUM

DURING THE YEAR 1876.

I. ZOÖLOGICAL.

I. By Donation.

A green snake — *Cyclophis vernalis* (De Kay), found beneath timber, in July, coiled around five of her eggs, From —— ?

An albino rat, from W. C. Johnson, Newburyport, Mass.

A barred owl — *Syrnium nebulosum* (Forst.), taken in Watervliet, Albany county, N. Y., Oct. 26th. From Thomas H. Ham, Albany, N. Y.

A night heron — *Nyctiardea Gardeni* (Gmel.) = Ardea discors of DeKay. From M. B. Planck, M. D., Schenectady, N. Y.

A Cecropia moth — *Samia Cecropia* (Linn.), from S. B. Woolworth, LL. D., Albany, N. Y.

A Cecropia moth, from William Russell, Albany, N. Y.

Nineteen species of Mollusca collected at Peconic Bay, L. I. (17), and (2) at Lake Minisink, L. I., by George R. Howell, N. Y. State Library.

Ensatella Americana (Gould).
Mya arenaria Linn.
Mactra solidissima Chemn.
Venus mercenaria Linn.
Lævicardium Mortoni Conr.
Astarte castanea Say.
Anodonta fluviatilis Dill.
Mytilus edulis (Linn.).
Pecten irradians Lam.
Anomia glabra Verrill.
Ranella caudata Say.
Pandora trilineata Say.
Buccinum plicosum Menke.
Nassa obsoleta Say.
Busycon carica (Gmel.).
Lunatia triseriata Say.
Crepidula fornicata Linn.
Crepidula plana Say.
Melampus bidentata Say.

Insects, collected at Stuyvesant Falls, Columbia county, N. Y., as follows:

Hymenoptera:
Tremex columba (Linn.).
Lepidoptera:
Papilio Troilus Linn.
Argynnis Cybele Fabr.
Argynnis Atlantis Edw.
Argynnis Bellona Fabr.
Phyciodes tharos (Drury).
Grapta interrogationis (Fabr.)
Vanessa Antiopa (Linn.).
Pyrameis Atalanta (Linn.).
Limenitis Ursula (Fabr.).
Satyrus Alope (Fabr.).
Neonympha Eurytris (Fabr.).
Sesia Thysbe (Fabr.).
Darapsa Myron (Cram.).
Deilephila lineata (Fabr.).
Ceratomia Amyntor (Hübn.).
Macrosila Carolina (Linn.).
Sphinx chersis (Hübn.).
Samia Cecropia (Linn.).
Telea Polyphemus (Linn.).
Anisota senatoria (Sm.-Abb.).
Catocala ultronia (Hübn.).
Ennomos magnaria (Linn.).
Hemerophila unitaria Hr.-Sch.
Coleoptera:
Cicendela sexguttata (Fabr.).
Alaus oculatus (Linn.).
Monohammus titillator Harr.
Clytus pictus Harr.
Clytus speciosus Say.
Cetonia Inda Linn.
Hemiptera:
Belostoma Americanum Leidy.
Cicada canicularis Harr.
Orthoptera:
Platyphyllum concavum Say.
Diapheromera femorata (Say).
Neuroptera:
Æschna heros Fabr.
Libellula trimaculata De Geer.
Agrion —— sp. ?

From JAMES J. CLOW, Stuyvesant Falls, N. Y.

II. BY PURCHASE.

An intestinal worm — *Ascaris lumbricoides* Linn., from a faucet of the city water-works, at J. Redmond's, 105 Beaver street, Albany.

A mounted skin of a rhinoceros — *Rhinoceros Indicus*, and a mounted skin of a giraffe. The animals were obtained from Forepaugh's Menagerie, and mounted for the Museum by Prof. Ward of Rochester.

II. BOTANICAL.

I. BY DONATION.

One hundred and twenty species of Fungi. From M. C. COOKE, London, England.

Three hundred and sixty-one specimens, representing 281 species of Fungi. From CHARLES B. PLOWRIGHT, M. D., Lynn, England.

Twenty-one species of Fungi and one flowering plant. From H. A. WARNE, Oneida, N. Y.

Ten species of Fungi. From W. R. GERARD, New York city.

Forty species of Fungi, some new to science. From Hon. G. W. CLINTON, Buffalo, N. Y.

Eleven species of Fungi. From C. C. FROST, Brattleborough, Vt.

Three species of flowering plants. From E. L. MILLER, Wading River, N. Y.

Thirty-three species of Fungi. From J. B. ELLIS, Newfield, N. J.

A new species of fungus on fir-cones. From W. C. STEVENSON, Philadelphia, Pa.

Two species of pine. From Prof. J. W. CHICKERING, Washington, D. C.

Specimens of *Pinus Tæda* L. From W. M. CANBY, Wilmington, Del.

Specimens of *Chenopodium leptophyllum* Nutt. From F. W. HALL, New Haven, Conn.

Specimens of *Laurus nobilis* L., and specimens of rose and elm wood. From C. DEVOL, M. D., Albany, N. Y.

Specimens of four species of sumac wood and of *Celastrus scandens* L. From W. W. HILL, Albany, N. Y.

Elongated fibrous roots of elm, taken from a well. From GEORGE J. SHARPE, East Greenbush, N. Y.

II. BY COLLECTION.

One hundred and thirty-three species of Fungi, and three species of flowering plants. By the Botanist, CHARLES H. PECK.

III. GEOLOGICAL, PALÆONTOLOGICAL AND MINERALOGICAL.

A concretionary form of Chert in Limestone. From Rev. RICHARD DECKER, Saugerties, N. Y.

A clay concretion of interesting form: West Albany, N. Y. From John Einzig, Albany, N. Y.

Silver ore from a mine, at Whittingham Center, Vt. From Cyrus Temple, M. D., Sadawga Springs, Whittingham, Vt.

Crystals of Selenite: Guilderland, Albany county, N. Y. From E. Schoolcraft, Guilderland.

Slickensides, from Hudson River Shales: Greenbush, N. Y. From E. J. Genet, Greenbush.

Block of Granite with glaciated surface: Quarry of A. Gracie King, near Garrison's, Putnam county, N. Y. Collection of the Director.

Block of Grey Granite (6½ inches cube), showing rock fracture, fine dressing, a polished and a glaciated surface. (No. 165 in Economic Coll.)

Slab of Grey Granite (48 × 39 × 3 inches, average meas.), with glaciated surface. (No. 166 in Economic Coll.)

Slab of Grey Granite (54 × 40 × 4 inches, av. meas.), with glaciated surface. (No. 167 in Economic Coll.) The above three specimens are from the Quarries near Garrison's, N. Y. From J. Howard Ellers.

Block of Grey Granite (14 × 10 × 5 inches), having imbedded a block of Gneiss (8 × by 5½ × inches). From quarries at Westerly, R. I. (No. 168 in Economic Coll.) From George T. Batterson, Hartford, Conn.

A water-worn piece of Corniferous Limestone taken from beneath a clay-bed in Rensselaerville, N. Y. From Cortlin Hughes.

Favosites Gothlandica in Corniferous Limestone: Coeymans, N. Y. From C. M. Tompkins.

Fifty-six specimens of Fossils from the Guelph Formation at Elora, Ontario. From David Boyle, Elora.

Three species of fossils, *Strophodonta hybrida* Hall, *Gypidula læviuscula* Hall, and *Paracyclas Sabini* White, from the Chemung (1st and 3d) and Hamilton Groups of Iowa. From B. F. Hoyt, Iowa City, Iowa.

Tip of the tusk and a tooth of the Cohoes Mastodon. From the University of Wisconsin, through Prof. Roland D. Irving, Madison, Wis. (in exchange for Museum Reports).

Eighteen examples of fossils from the Coralline beds of the Hamilton age, at Iowa City, Iowa, among which are the following: *Acervularia Davidsoni* (two polished), *Favosites Gothlandica* (one polished), *Idiostroma Gordiaceum* and *Coenostromya* sp. ? From C. W. IRISH, Iowa City, in return for State Museum Reports.

Five specimens of Cinnabar, one of Quartz, and several fragments of Calcite. From W. CHURCH. Donated in 1868, and not previously credited.

IV. ARCHÆOLOGICAL, ETC.

An Indian stone implement: Rotterdam, Schenectady, N. Y. From ROBERT SCHERMERHORN.

A flint arrow-head. From WILLIAM SCHOONMAKER, Cedar Hill, N. Y.

Indian tomahawk (French origin), taken from twenty feet below the surface of the ground, in Grangerville, Saratoga county, N. Y. From FRANK E. GRIFFIN, Albany, N. Y.

Indian arrow-heads of shale.

A wooden needle, in use about the year 1780, for weaving harness for hand-looms. From GEORGE W. BROWER, Schenectady, N. Y.

An ancient fire-tongs, uncovered by a land-slide in Swan street, Albany, in 1874. From JOHN J. NEWMAN, Albany, N. Y.

A piece of the "council tree" at Schaghticoke, N. Y. From CHARLES DEVOL, M. D., Albany, N. Y.

An iron spike, seven inches long, from Commodore Perry's flag ship, St. Lawrence. Procured at Erie, Pa. From Prof. JAMES HALL, Albany, N. Y.

V. TO THE LIBRARY.

Catalogue of the Pleistocene Vertebrata, from the neighborhood of Ilford, Essex, in the collection of Sir Antonio Brady, Kt., J. P., F. G. S., etc. By William Davies, with an introduction by Sir Antonio Brady. London, 1874. Pamph., 8 vo., pp. xxviii+75. From SIR ANTONIO BRADY.

Entomological Notes: — V. By S. H. Scudder. Boston, 1876. Pamph., 8vo., pp. 72.

Extract from Psyche. Synonyptical Tables for determining N. A. Insects. Orthoptera. By S. H. Scudder. Cambridge, June, 1876. Pamph., 8vo., pp. 3.

A Cosmopolitan Butterfly. By S. H. Scudder. Cambridge, 1876. Pamph., 8vo., pp. 14.

Extracts from Bulletins of the Geological and Geographical Survey of the Territories. Vol. II, No. 3: Synopsis of North American Earwigs.—List of Orthoptera collected in Colorado and the neighboring territories in 1875.—Notice of a collection of Butterflies made in Colorado and Utah in 1875. By S. H. Scudder. Washington, June, 1876. Pamph., 8vo., pp. 249-270. From the AUTHOR.

Transactions of the Kansas Academy of Science for 1874. Topeka, 1875. Pamph., 8vo., pp. 31.

Transactions of the Kansas Academy of Science. Topeka, 1875. Vol. IV. Pamph., 8vo., pp. 62.

A Catalogue of the Birds of Kansas, contributed to the Kansas Academy of Science. By F. H. Snow. November, 1875. Pamph., 8vo., pp. 14. From EDWIN A. POPENOE.

Auditor of Accounts' Annual Report of the Receipts and Expenditures of the City of Boston and the County of Suffolk, for the Year 1875-76. Boston, 1876. From ALFRED T. TURNER, Auditor.

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REPORT OF THE BOTANIST.

S. B. Woolworth, LL. D., *Secretary of the Board of Regents of the University:*

Sir.—Since the date of my last report, specimens of one hundred and sixty-five species of plants have been mounted and placed in the Herbarium, of which one hundred and thirty were not before represented therein. A list of these is marked (1).

Specimens have been collected in the counties of Albany, Essex, Greene, Hamilton, Otsego, Rensselaer and Saratoga. These represent *one hundred and thirty-two* species new to the Herbarium, one hundred and twenty-nine of which are fungi. Of these, sixty-nine are regarded as new or previously undescribed species. A list of plants collected is marked (2).

Specimens of thirty-six New York species, new to the Herbarium and not among my collections of the past season, have been furnished by correspondents. These added to those collected make the whole number of additions *one hundred and sixty-eight.* There are besides a considerable number of extralimital contributions. A list of the contributors and their contributions is marked (3).

New species with their descriptions and previously unreported species are given in a section marked (4). New stations of rare plants, remarks and observations are given in a section marked (5).

While on a collecting trip in the Adirondack region, in July and August, my attention was repeatedly arrested by the extensive ravages of the spruce-destroying beetle, *Hylurgus rufipennis* Kirby, of which a partial account was given in the twenty-eighth report. The green slopes of Mt. Emmons, commonly called Blue Mountain, and of several mountains to the north of it had their beauty, and their value too, greatly impaired by the abundant intermixture of the brown tops of dead spruces. The destruction was also visible along the road between Newcomb and Long Lake, and on the mountain slopes far to the north of this road. Again, on the trail from Adirondack to Calamity Pond, there was sad evidence that the little destroyer had invaded also the forests of Essex county. From what I have seen at Lake Pleasant, in the southern part, and in the vicinity of Long Lake, in the northern part, and from information concerning the Cedar river region, in the central part of Hamilton county, there is reason to believe that much of the spruce timber of this county has already been invaded by the beetle. How much farther this destructive work has extended, or will extend, it is impossible to say. But one thing is certain, it is still in progress.

For the purpose of gaining more knowledge of the insect, I cut down, at South Pond, a tree that had recently been attacked by it. It was about twenty inches in diameter at the base; the foliage was still fresh and green, and there was nothing, except the perforations in the bark, to indicate that it was at all affected. The bark peeled from the trunk without much difficulty, the sap wood was perfectly sound, and the heart wood also, except a small portion in which there was a slight appearance of incipient decay. Longitudinal furrows, varying from one to six inches in length, were found under the bark, and each furrow was occupied by one or two beetles. The furrows are excavated from below upwards. In the short ones but one beetle was found, and but one perforation communicating with the external air. In the longer ones two beetles (probably the two sexes), were usually found, and from two to four perforations afforded means of ingress and egress. The lowest perforation, which is the one by which the beetle first enters and commences its furrow, is often found closed or "blocked up" by the dust and debris thrown down by the excavator in the progress of the work. The second perforation is generally one or two inches above the first. I failed to discover whether it is made by the second beetle for the purpose of ingress or by the first beetle. The third and fourth perforations are in a nearly direct line above the other two and are probably made from within outwardly, but for what purpose is uncertain. In one instance the two beetles were found at work making these perforations, boring through from the inner surface of the bark. In one instance the third was less than half an inch above the second, so that there would seem to be no particular necessity for it.

The eggs of the insect are deposited along both sides of the upper part of the furrow. They lie close together, almost or quite in contact with each other. When the larvæ emerge from the eggs they begin to feed upon the soft cambium and to work their way under the bark at right angles to the main furrow. They are, at first, so minute and work so close together that they make no distinct furrows but seem rather to devour entirely a very thin layer of the cambium. But as they increase in size they begin gradually to form distinct furrows and to take directions more divergent from each other and from their original course. In this way colonies from contiguous furrows at length run together and in time the whole trunk is surrounded by their multitudinous pathways, and the death of the tree is accomplished. Great care is taken by the parent beetles to keep *their* furrows separate. No instance was observed in which they ran together. In one instance the course of a furrow was changed to avoid running into the lateral furrows of a colony of larvæ just above. No furrows were found in the tree more than ten or twelve feet from its base, thus indicating that the attacks are made upon the lower part of the trunk. The attacks are not made simultaneously. Some of the furrows in this tree were scarcely more than an inch long, and evidently had been just commenced. Others were fully excavated and contained eggs, and in others still the larvæ had hatched and commenced their work, but in none were they fully grown. In another tree, a few rods distant from the first, the attack had evidently been made earlier in the season, for the larvæ were farther advanced in size and the bark, on one side of the tree was well loosened, though, strange to say, the other side of the trunk was comparatively unharmed. I was unable to discover why, in this instance, the attack was limited to one side of the trunk. It is pretty evident, therefore, that the trees are attacked all along during the months of June and July and possibly as late as August. I suspect, also, that the parent beetle, after having established a colony in one place may emerge from her furrow to repeat the operation in another place, either in the same trunk or in a different one, but this I was not able to ascertain definitely.

A whitish fungus, *Polyporus volvatus* Pk., scarcely larger than a hickory nut, occurs in considerable abundance on the trunks of spruces killed by this beetle. The mycelium of the fungus grows beneath the bark, and the external plant is connected with it through the perforations made by the insect. Hence this fungus becomes a conspicuous indicator of the track of the beetle and tells the tale of its destructive power.

(1.)

PLANTS MOUNTED.

Not new to the Herbarium.

Nuphar Kalmiana *Pursh.*
Xanthoxylum Americanum
Ceanothus Americanus *L.*
Melilotus officinalis *Willd.*
M. alba *Lam.*
Desmodium acuminatum *DC.*
Aster puniceus *L.*
Solidago gigantea *Ait.*
Taraxacum Dens-leonis *Desf.*
Azalea viscosa *L.*
Nemopanthes Canadensis *DC.*
Allium vineale *L.*
Scirpus maritimus *L.*
Oryzopsis Canadensis *Torr.*
Agrostis scabra *Willd.*
Agaricus cæsareus *Scop.*
A. granulosus *Batsch.*
A. mollis *Schæff.*
A. vulgaris *Pers.*
A. Orcella *Bull.*
Cantharellus cinnabarinus
Merulius bellus *B. & C.*
Tremellodon gelatinosum *Pers.*
Thelephora caryophyllea *Fr.*
Clavaria Botrytis *Pers.*
Solenia ochracea *Hoffm.*
Tremella Fungicola *Pk.*
Lycoperdon pusillum *Fr.*
Phoma Verbascicola *Schw.*
Nemaspora Russellii *B. & C.*
Melanconium bicolor *Nees.*
Cladosporium Herbarum *Lk.*
Helotium rugipes *Pk.*
Diatrype prominens *Howe.*
Valsa nivea *Fr.*

New to the Herbarium.

Omphalaria pulvinata *Nyl.*
Agaricus Peckii *Howe.*
A. transmutans *Pk.*
A. sapidus *Kalchb.*
A. tremulus *Schæff.*
A. abundans *Pk.*
A. citrinellus *Pers.*
A. Stylobates *Pers.*
A. pubescentipes *Pk.*
A. pruinatipes *Pk.*
A. teneroides *Pk.*
A. placomyces *Pk.*
A. squalidellus *Pk.*
A. elongatipes *Pk.*
A. atomatoides *Pk.*
A. incertus *Pk.*
Coprinus pulchrifolius *Pk.*
C. plumbens *Pk.*
Cortinarius splendidus *Pk.*
C. sphagnophilus *Pk.*
C. robustus *Pk.*
Gomphidius rhodoxanthus

Hygrophorus speciosus *Pk.*
Lactarius subpurpureus *Pk.*
L. parvus *Pk.*
Marasmius spongiosus *B & C.*
Boletus badius *Fr.*
B. parasiticus *Bull.*
B. Russellii *Frost.*
B. Peckii *Frost.*
B. nigrellus *Pk.*
B. Ravenelii *B. & C.*
B. griseus *Frost.*
Corticium sulphureum *Fr.*
Exobasidium Cassandræ *Pk.*
Lycoperdon constellatum *Fr.*
L. coloratum *Pk.*
Chondrioderma Michelii *Lib.*
Lamproderma physaroides
Phoma nebulosum *Berk.*
Cryptosporium Caricis *Cd.*
C. Noveboracense *B. & C.*
Melasmia alnea *Lev.*
Peckia Clintonii *Pk.*
P. Sarraceniæ *P. & C.*
Vermicularia concentrica
Excipula leucotricha *Pk.*
Septoria cerasina *Pk.*
S. Polygalæ *P. & C.*
S. emaculata *P. & C.*
S. difformis *C. & P.*
S. Ulmi *Kze.*
Discella Kalmiæ *Pk.*
D. Platani *Pk.*
D. macrosperma *Pk.*
Melanconium pallidum *Pk.*
Sporidesmium concinnum
Clasterisporium uncinatum
Puccinia Calthæ *Lk.*
P. Gentianæ *Strauss.*
P. Physostegiæ *P. & C.*
Uromyces Claytoniæ *C. & P.*
Ustilago Candollei *Tul.*
Graphiola Phœnicis *Poir.*
Stilbum vulgare *Tode.*
S. smaragdinum *A. & S.*
Epicoccum neglectum *Desm.*
Ægerita candida *Pers.*
Periconia truncata *C. & P.*
P. corticalis *C. & P.*
Cercospora Callæ *P. & C.*
Helminthosporium oösporum
H. episphæricum *C. & P.*
Polyactis pulvinata *B. &. C.*
Ramularia Nemopanthis
Stysanus Stemonitis *Cd.*
Dactylium roseum *Berk.*
Fusisporium phyllogenum
F. parasiticum *Pk.*
Chætomium funicolum *Ck.*
Uncinula geniculata *Ger.*
Peziza imperialis *Pk.*
P. griseo-rosea *Ger.*
P. bronca *Pk.*
P. longipes *C. & P.*
P. Pinastri *C. & P.*
P. agrostina *Pk.*
P. Thalictri *Pk.*
P. virginella *Ck.*
P. subtilissima *Ck.*
Helotium hydrogenum *Pk.*
Ascobolus ciliatus *Schw.*
A. furfuraceus *Pers.*
Stictis versicolor *Fr.*
S. filicina *Pk.*
Tympanis gyrosa *B. & C.*
Hypocrea Patella *C. & P.*
H. chromosperma *C. & P.*
H. apiculata *C. & P.*
Hypomyces transformans *Pk.*
Melogramma superficialis *Pk.*
Dothidea filicina *Fr.*
Diatrype Smilacicola *Schw.*
D. Cephalanthi *Schw.*

Valsa Linderæ *Pk.*
V. Fraxinicola *C. & P.*
V. cinctula *C. & P.*
V. tumidula *C. & P.*
V. trichispora *C. & P.*
V. leptasca *P. & C.*
Sphæria cæsariata *C. & P.*
S. exilis *A. & S.*
S. spermoides *Hoffm.*
S. salebrosa *C. & P.*
S. recessa *C. & P.*
S. obducens *Fr.*
Sphæria obtusissima *B. & C.*
S. interstitialis *C. & P.*
S. squalidula *C. & P.*
S. Fimeti *Pers.*
S. spiculosa *Pers.*
S. ceanothina *Pk.*
S. melanassa *Pk.*
S. fulgida *C. & P.*
S. minutella *Pk.*
S. culmifraga *Desm.*
S. Collinsii *Schw.*
Sphærella colorata *Pk.*

(2.)

PLANTS COLLECTED.

Trifolium hybridum *L.*
Lonicera Tartarica *L.*
Crepis aurantiaca *L.*
Agaricus striatifolius *Pk.*
A. apertus *Pk.*
A. peltigerinus *Pk.*
A. flavidellus *Pk.*
A. striatulus *Fr.*
A. subareolatus *Pk.*
A. conigenoides *Ellis.*
A. delicatellus *Pk.*
A. odorifer *Pk.*
A. longistriatus *Pk.*
A. ophiopus *Pk.*
A. angustipes *Pk.*
A. indecens *Pk.*
A. contrarius *Pk.*
A. umbonatescens *Pk.*
A. lacrymabundus *Fr.*
A. Candolleanus *Fr.*
A. limophilus *Pk.*
A. arenulinus *Pk.*
A. polytrichophilus *Pk.*
A. graciloides *Pk.*
Cortinarius craticius *Fr.*
C. regularis *Pk.*
Marasmius præacutus *Ellis.*
Panus torulosus *Fr.*
Boletus viscosus *Frost.*
Polyporus osseus *Kalchbr.*
P. dualis *Pk.*
P. nidulans *Fr.*
P. fragans *Pk.*
P. albellus *Pk.*
P. connatus *Weinm.*
Hydnum Weinmanni *Fr.*
Irpex obliquus *Fr.*
I. fuscoviolaceus *Fr.*
I. sinuosus *Fr.*
Radulum orbiculare *Fr.*
Phlebia merismoides *Fr.*
Grandinia rudis *Pk.*
Thelephora speciosa *Fr.*
Hymenochæte spreta *Pk.*
H. agglutinans *Ellis.*
Corticium quercinum *Fr.*
C. lacteum *Fr.*
C. Sambuci *Fr.*

Corticium Martianum *B. & C.*
C. suffocatum *Pk.*
Cyphella griseopallida *Weinm.*
Clavaria typhuloides *Pk.*
Pistillaria coccinea *Cd.*
Tremella intumescens *Sow.*
Næmatelia cerebriformis *Ellis.*
Dacrymyces minor *Pk.*
Bovista pila *B. & C.*
Amaurochæte atra *A. & S.*
Physarum luteolum *Pk.*
P. albicans *Pk.*
Diachæa splendens *Pk.*
Trichia fallax *Pers.*
Clathroptychium rugulosum
Nidularia pulvinata *Schw.*
Leptostroma lineare *Pk.*
Sphæronema Robinæ *B. & C.*
S. aurantiacum *Pk.*
Sphæropsis minima *B. & C.*
Acrospermum graminum *Lib.*
Excipula lanuginosa *Pk.*
Discella Canadensis *Pk.*
D. arida *Pk.*
Melanconium intermedium *Pk.*
Torula curvata *Pk.*
Melampsora Epilobii *Fckl.*
Uredo Cassandræ *P. & C.*
Puccinia orbicula *P. & C.*
Helminthosporium Absinthii
Cladosporium nodulosum *Cd.*
Ramularia brunnea *Pk.*
Cercospora Symplocarpi *Pk.*
C. leptosperma *Pk.*
C. Ampelopsidis *Pk.*
C. Chenopodii *Fckl.*
Peronospora alta *Fckl.*
P. infestans *De By.*
Dactylium sublutescens *Pk.*
Oidium albipes *Pk.*
O. fasciculatum *Berk.*
Capillaria Sphæriæ-typhinæ
Menispora ciliata *Cd.*
Fusisporium rimosum *Pk.*
Zygodesmus pannosus *B. & C.*
Z. rubiginosus *Pk.*
Morchella deliciosa *Fr.*
Peziza Warnei *Pk.*
P. deligata *Pk.*
P. myricacea *Pk.*
P. bicolor *Bull.*
P. sulphurella *Pk.*
P. distincta *Pk.*
P. capitata *Pk.*
P. chamæleontina *Pk.*
P. Polygoni *Rehm.*
Helotium caricinellum *Pk.*
H. bryogenum *Pk.*
Dermatea carpinus *Fr.*
D. inclusa *Pk.*
Stictis cylindricarpa *Pk.*
Ascobolus viridis *Curr.*
A. crenulatus *Karst.*
Tympanis turbinata *Schw.*
Glonium simulans *Ger.*
Hypoderma Desmazierii *Duby.*
Hypomyces ochraceus *Tul.*
Hypoxylon suborbiculare *Pk.*
Dothidea Caricis *Fr.*
D. Osmundæ *P. & C.*
D. episphæria *Pk.*
Diatrype ferruginea *Fr.*
Valsa Juglandicola *Schw.*
V. innumerabilis *Pk.*
Lophiostoma obtectum *Pk.*
Sphærella Vaccinii *Ck.*
S. Impatientis *P. & C.*
Sphæria exercitalis *Pk.*
S. sphærellula *Pk.*
S. Clasterium *B. & C.*
S. viridella *Pk.*
S. scapophila *Pk.*
Pyrenophora phæocomes *Fr.*

(3.)

CONTRIBUTORS AND THEIR CONTRIBUTIONS.

M. C. Cooke, London, England.

Leptostroma juncinum *Fr.*
L. filicinum *Fr.*
Leptothyrium Ribis *Lib.*
L. Fragariæ *Lib.*
L. Juglandis *Lib.*
Dinemasporium Herbarum *Ck.*
Aposphæria acuta *Berk.*
A. complanata *Berk.*
Septoria Ulmi *Kze.*
S. Convolvuli *Desm.*
S. Clematidis *Desm.*
S. Viburni *West.*
S. Gei *Desm.*
S. Hederæ *Desm.*
S. Oxyacanthæ *Kze.*
S. Castanæcola *Lasch.*
S. Astragali *Desm.*
S. Ficariæ *Duby.*
S. Hydrocotyles *Duby.*
S. Pyricola *Desm.*
S. Chelidonii *Desm.*
S. Œgopodii *Desm.*
Phyllosticta vulgaris *Desm.*
P. Atriplicis *Desm.*
Phoma Samarorum *Desm.*
Centhospora phacidioides *Grev.*
Asteroma Rosæ *DC.*
Xenodochus carbonarius *Sch.*
Aregma mucronatum *Fr.*
A. obtusatum *Fr.*
A. acuminatum *Fr.*
A. bulbosum *Fr.*
Triphragmium Ulmariæ *Lk.*
Puccinia Saniculæ *Grev.*
P. bullaria *Lk.*
P. Anemones *Pers.*
Puccinia Nolitangeris *Cd.*
P. Violarum *Lk.*
P. Lychnidearum *Lk.*
P. pulverulenta *Grev.*
P. Circææ *Grev.*
P. Prunorum *Lk.*
P. Polygonorum *Lk.*
P. Primula *Grev.*
P. Glechomatis *DC.*
P. Menthæ *Pers.*
P. Comp. v. Centauræ *Schl.*
P. “ serratulæ *Schl.*
P. Syngenesiarum *Lk.*
P. Umbelliferarum *Lk.*
P. Apii *Cd.*
P. Vineæ *Berk.*
P. Umbilici *Guep.*
P. Graminis *Pers.*
P. Veronicarum *DC.*
P. Mœhringii *Fckl.*
P. difformis *Kze.*
P. Scorodoniæ *Lk.*
P. Tanaceti *DC.*
P. Buxi *DC.*
Uromyces Iridis *Lev.*
U. Polygoni *Lev.*
U. intrusus *Lev.*
U. Ulmariæ *Lev.*
U. concentricus *Lev.*
Trichobasis Senecionis *Berk.*
T. Labiatarum *Lev.*
T. Cichoracearum *Lev.*
T. Hydrocotyles *Ck.*
T. Betæ *Lev.*
T. Fabæ *Lev.*
T. Galii *Lev.*

Trichobasis Parnassiæ *Ck.*
T. caricina *Berk.*
T. Petroselini *Berk.*
T. fallens *Ck.*
T. Rumicum *DC.*
T. Geranii *Berk.*
T. Umbellatarum *Lev.*
Tilletia caries *Tul.*
Urocystis pompholygodes *Lev.*
Ustilago segetum *Ditm.*
U. Salvei *Berk.*
U. longissima *Tul.*
U. utriculosa *Tul.*
Lecythea gyrosa *Lev.*
L. Euphorbiæ *Lev.*
L. Valerianæ *Lev.*
Uredo confluens *DC.*
U. Circææ *A. & S.*
U. pustulata *Pers.*
U. Caryophyllacearum
Coleosporium Sonchi *Lev.*
C. Tussilaginis *Lev.*
C. ochraceum *Bon.*
C. Rhinanthacearum.
Cystopus candidus *Lev.*
C. spinulosus *De By.*
Melampsora salicina *Lev.*
M. populina *Lev.*
M. Tremulæ *Tul.*
Roestelia cornuta *Tul.*
Æcidium crassum *Pers.*
Æ. Euphorbiæ *Pers.*
Æ. Epilobii *DC.*
Æ. leucospermum *DC.*
Æ. Grossulariæ *DC.*
Æ. Comp. v. Tussilaginis.
Æ. " Lampsanæ.
Æ. " Bellidis.
Æ. Saniculæ *Carm.*
Æ. Allii *Grev.*
Æ. Valerianacearum *Duby.*
Æ. rubellum *Pers.*
Æ. Berberidis *Pers.*
Æ. Periclymeni *DC.*
Æ. Ranunculacearum *DC.*
Æ. Tragopogonis *Pers.*
Peronospora infestans *De By.*
P. parasitica *Cd.*
Microsphæra comata *Lev.*
Erysiphe Linkii *Lev.*
E. tortilis *Lev.*

C. B. PLOWRIGHT, M. D., Lynn, England.

Agaricus muscarius *L.*
A. granulosus *Batsch.*
A. ustalis *Fr.*
A. cyathiformis *Bull.*
A. galericulatus *Scop.*
A. fascicularis *Huds.*
A. virginicus *Jacq.*
Cantharellus cibarius *Fr.*
Marasmius oreades *Fr.*
Panus stypticus *Fr.*
Polyporus perennis *Fr.*
P. squamosus *Fr.*
P. adustus *Fr.*
P. hirsutus *Fr.*
P. versicolor *Fr.*
Dædalea unicolor *Fr.*
D. quercina *Fr.*
Trametes Pini *Fr.*
T. suaveolens *Fr.*
Merulius lacrymans *Fr.*

Hydnum repandum *L.*
Fistulina hepatica *Fr.*
Craterellus flavescens.
Hymenochæte rubiginosa *Lev.*
Corticium quercinum *Fr.*
C. comedens *Fr.*
C. Sambuci *Fr.*
C. incarnatum *Fr.*
Clavaria flava *Pers.*
Scleroderma vulgare *Fr.*
Lycoperdon cælatum *Bull.*
Lycogala epidendrum *Fr.*
Spumaria alba *DC.*
Diderma vernicosum *Pers.*
Didymium farinaceum *Fr.*
Arcyria punicea *Pers.*
Cyathus striatus *Hoffm.*
C. Crucibulum *Pers.*
Sphærobolus stellatus *Tode.*
Leptostroma litigiosum *Desm.*
Cryptosporium Neesii *Cd.*
Phoma subordinarium *Desm.*
P. errabundum *Desm.*
P. complanatum *Desm.*
P. longissimum *Pers.*
P. Samarorum *Desm.*
Diplodia Ligustri *Awd.*
D. Fraxini *Fr.*
D. melæna *Lev.*
D. Coryli *Fckl.*
D. Syringæ *Awd.*
D. Mori *Awd.*
D. Juglandis *Fr.*
Hendersonia Rosæ *Awd.*
H. Rubi *Awd.*
H. Corni *Fckl.*
Vermicularia Dematium *Fr.*
Melasmia alnea *Lev.*
M. acerina *Lev.*
Piggotia astroidea *Berk.*
Septoria Hederæ *Desm.*
Septoria quercina *Desm.*
S. Aceris *B. & Br.*
S. Oxyacanthæ *Kze.*
S. Ulmi *Fr.*
S. Anemones *Fckl.*
S. Stellariæ *West.*
S. Astragali *Lasch.*
S. Castanæcola *Desm.*
S. Ficariæ *Desm.*
S. Fraxini *Desm.*
S. Ægopodii *Desm.*
S. Hepaticæ *Desm.*
S. Convolvuli *Desm.*
S. Tiliæ *Desm.*
S. Urticæ *Desm.*
Phyllosticta Cornicola *Rbh.*
P. Primulæcola *Desm.*
P. Symphoricarpi *West.*
Depazea populina *Fckl.*
D. Vincetoxici *Schub.*
D. Frondicola *Fr.*
D. Œnotheræ *Lasch.*
D. juglandina *Fr.*
D. cruenta *Fr.*
D. Æsculicola *Fr.*
Darluca filum *Cast.*
Ascochyta Polygoni *Rbh.*
A. Ebuli *Fckl.*
A. Rubi *Lasch.*
Asteroma Rosæ *DC.*
A. Ulmi *Kl.*
A. Hoffmani *Kze.*
Discella carbonacea *B. & Br.*
Stilbospora angustata *Pers.*
Stegonosporium cellulosum *Cd.*
Libertella betulina *Desm.*
Melanconium Juglandis *Kze.*
M. sphærospermum *Lk.*
M. bicolor *Nees.*
M. macrospermum *Tul.*
Coryneum pulvinatum *Kze.*

Coryneum disciforme *Kze.*
Bispora monilioides *Cd.*
Cytispora elegans *Ces.*
C. populina *Fr.*
Synchytrium Succisæ *De By.*
S. Anemones *Wor.*
Puccinia Tanaceti *DC.*
P. Hieracii *Mart.*
P. Prunorum *Lk.*
P. Menthæ *Pers.*
P. coronata *Cd.*
P. obtegens *Tul.*
P. Lampsanæ *Fckl.*
P. Bardanæ *Cd.*
P. Cirsii *Lasch.*
P. Luzulæ *Lib.*
P. Caricis *Fckl.*
P. Ægopodii *Lk.*
P. Glechomæ *DC.*
P. Compositarum *Schl.*
P. Syngenesiarum.
P. Malvacearum *Mont.*
P. Straminis *Fckl.*
P. Asparagi *DC.*
P. arundinacea *Hedw.*
P. Brachypodii *Fckl.*
P. Graminis *Pers.*
P. Amphibii *Fckl.*
Phragmidium Tormentillæ *Cd.*
P. apiculatum *Rbh.*
P. incrassatum *Lk.*
Uromyces Ficariæ *Lev.*
U. Polygoni *Fckl.*
U. Viciæ *Fckl.*
U. Trifolii *Fckl.*
U apiculatus *Lev.*
U. Betæ *Kuhn.*
U. scutellatus *Kl.*
Ustilago Carbo *Tul.*
U. longissima *Tul.*
U. hypodytes *Fr.*
Uredo Filicum *Desm.*
U. Vacciniorum *Pers.*
U. arundinacea *Rbh.*
Coleosporium Compositarum
C. Campanulacearum *Fr.*
C. Senecionis *Fr.*
C. ochraceum *Bon.*
Melampsora Lini *Desm.*
M. Tremulæ *Tul.*
M. Epilobii *Fckl.*
M. salicina *Lev.*
M. acerina *Lev.*
M. betulina *Tul.*
M. Euphorbiæ *Cast.*
Æcidium Violæ *Schum.*
Æ. Xylostei *Wallr.*
Æ. Compositarum *Mart.*
Æ. Berberidis *Pers.*
Æ. Convallariæ *Schum.*
Æ. Tussilaginis *Pers.*
Æ. Thesii *Desv.*
Æ. Ranunculacearum *DC.*
Æ. rubellum *Pers.*
Æ. elongatum *Lk.*
Æ. leucospermum *DC.*
Æ. Epilobii *DC.*
Æ. Urticæ *DC.*
Æ. Behenis *DC.*
Æ. Euphorbiæ *Pers.*
Rœstelia cornuta *Tul.*
Cystopus candidus *Lev.*
Ceratium hydnoides *A. & S.*
Cladosporium graminum *Lk.*
C. Fumago *Lk.*
Helminthosporium Tiliæ *Fr.*
H. arundinaceum *Cd.*
Oidium Tuckeri *Berk.*
O. fructigenum *Fr.*
Fusarium nervisequum *Fckl.*
Ramularia Urticæ *Ces.*
Peronospora nivea *Ung.*

Peronospora Alsinearum *DeBy*
P. grisea *De By.*
P. pygmæa *Ung.*
P. parasitica *Pers.*
P. gangliformis *Berk.*
Pilobolus crystallinus *Tode.*
Sphærotheca pannosa *Lev.*
S. Castagnei *Lev.*
Microsphæra Grossulariæ *Lev.*
M. holosericea *Lev.*
M. Berberidis *Lev.*
M. penicillata *Lev.*
Erysiphe Martii *Lev.*
E. Linkii *Lev.*
E. communis *Schl.*
Uncinula adunca *Lev.*
U. bicornis *Lev.*
U. Wallrothii *Lev.*
Podosphæra Kunzei *Lev.*
Phyllactinia guttata *Lev.*
Morchella esculenta *Pers.*
Leotia lubrica *Pers.*
Spathularia flavida *Pers.*
Peziza badia *Pers.*
P. aurantia *Fr.*
P. leporina *Batsch.*
P. cinerea *Batsch.*
P. Solani *Pers.*
P. atrata *Fr.*
P. fusca *Pers.*
P. fusarioides *Berk.*
Pseudopeziza Trifolii *Bernh.*
Helotium herbarum *Pers.*
Lachnella corticalis *Pers.*
Cenangium Cerasi *Fr.*
C. ferruginosum *Fr.*
Phacidium coronatum *Fr.*
P. minutissimum *Awd.*
P. Medicaginis *Lasch.*
Hysterium Pinastri *Fr.*
H. virgultorum *DC.*
Colpoma quercinum.
Dichæna strobilina *Fr.*
Rhytisma salicinum *Fr.*
R. acerinum *Fr.*
R. punctatum *Pers.*
Epichloe typhina *Berk.*
Nectria Peziza *Fr.*
N. pulicaris *Fr.*
N. ephisphæria *Fr.*
Xylaria Hypoxylon *Grev.*
X. polymorpha *Grev.*
Hypoxylon fuscum *Fr.*
Ustulina vulgaris *Tul.*
Eutypa flavovirens *Tul.*
Melogramma ferrugineum *Nke.*
Polystigma fulvum *DC.*
P. rubrum *DC.*
Dothidea Ulmi *Fr.*
D. Heraclei *Fckl.*
D. graminis *Pers.*
D. Junci *Fr.*
D. Ribesia *Fr.*
Diatrype stigma *Fr.*
D. favacea *Fr.*
D. disciformis *Fr.*
D. bullata *Fr.*
Valsa suffusa *Tul.*
V. salicina *Fr.*
V. nivea *Fr.*
V. stellulata *Fr.*
Cucurbitaria Spartii *De Not.*
C. Berberidis *Gr.*
C. Laburni *Fr.*
Massaria inquinans *Tode.*
M. pupula *Tul.*
Stegia Ilicis *Fr.*
Sphæria aquila *Fr.*
S. spermoides *Hoffm.*
S. pulvispyrius *Pers.*
S. coniformis *Fr.*
S. clara *Awd.*

Sphæria rubella *Pers.*
S. Herbarum *Pers.*
S. pilifera *Fr.*
S. obducens *Fr.*
S. Carduorum *Wallr.*
S. vulgaris *Ces.*
Isothea pustula *Berk.*
Sphærella ignobilis *Awd.*
Sphærella Cookeana *Awd.*
S. Populi *Awd.*
S. microspora *Awd.*
Venturia ditricha *Fr.*
Rophographus filicinus *Fckl.*
Exoascus Populi *Thum.*
Calyptospora Gœppertiana

Hon. G. W. CLINTON, Buffalo, N. Y.

Polyporus obducens *Fr.*
P. callosus *Fr.*
P. farinellus *Fr.*
Corticium Martianum *B. & C.*
C. cæruleum *Fr.*
Dacrymyces minor *Pk.*
Perichæna irregularis *B. & C.*
Phoma strobilinum *P. & C.*
P. stercorarium *P. & C.*
Sphæropsis Syringæ *P. & C.*
S. Pennsylvanica *B. & C.*
Sphæronema Robiniæ *B. & C.*
Diplodia thujina *P. & C.*
Melanconium intermedium
Septonema dichænoides *P. & C.*
Puccinia orbicula *P. & C.*
P. Hydrophylli *P. & C.*
Uredo Cassandræ *P. & C.*
Trichobasis Fabæ *Lev.*
Æcidium Saniculæ *Carm.*
Cladosporium depressum
Verticillium pulvereum *P. & C.*
Trichoderma viride *Pers.*
Oidium fasciculatum *Berk.*
Polyactis cana *Berk.*
Peziza vulpina *Ck.*
P. maculincola *Schw.*
P. macrospora *Fckl.*
Patellaria lignyota *Fr.*
Hysterium Rimincola *Schw.*
H. truncatulum *C. & P.*
Dothidea Osmundæ *P. & C.*
Valsa Juglandicola *Schw.*
Cucurbitaria Berberidis *Gr.*
Sphæria Clintonii *Pk.*
S. onosmodina *P. & C.*
S. Herbarum *Pers.*
Sphærella Impatientis *P. & C*

C. C. FROST, Brattleborough, Vt.

Marasmius erythropus *Fr.*
M. archyropus *Fr.*
Boletus viscosus *Frost.*
B. salmonicolor *Frost.*
Næmatelia nucleata *Fr.*
Endobotrya elegans *B. & C.*
Ceratium porioides *A. & S.*
Phymatospora leucosperma
Peziza Acetabulum *L.*
Patellaria lignyota *Fr.*
Sphæria scoriadea *Fr.*

E. S. MILLER, Wading River, N. Y.

Quercus obtusiloba *Mx.*
Q. monticola *Mx.*
Carya tomentosa *Nutt.*

H. A. WARNE, Oneida, N. Y.

Viola Selkirkii *Pursh.*
Agaricus naucinoides *Pk.*
A. personatus *Fr.*
A. æruginosus *Fr.*
Paxillus porosus *Berk.*
Polyporous medullapanis *Fr.*
Hydnum chrysodon *B. & C*
Grandinia virescens *Pk.*
Stereum rugosum *Fr.*
Clavaria amethystina *Bull.*
Guepinia helvelloides *DC*
Erysiphe Liriodendri *Schw.*
Morchella bispora *Sor.*
M. semilibera *DC.*
M. deliciosa *Fr.*
Verpa digitaliformis *Pers.*
Peziza sulcata *Pers.*
P. Warnei *Pk.*
Ascobolus crenulatus *Karst.*
Patellaria leptosperma *Pk.*
Sphæria xestothele *B. & C.*
Discosia rugulosa *B. & C.*

W. R. GERARD. New York, N. Y.

Ostropa cinerea *Duby.*
Hysterium prælongum *Schw.*
H. curvatum *Fr.*
H. Rousselii *De Not.*
H. aquilinum *Schum.*
Hysterium parvulum *Ger.*
H. australe *Duby.*
H. ellipticum *DC.*
Hypoderma nervisequum *Fr.*
Glonium simulans *Ger.*

J. B. ELLIS, Newfield, N. J.

Corticium fumigatum *Thum.*
C. rubrocanum *Thum.*
Microthyrium Smilacis *Not.*
Phoma consors *C. & E.*
Sphæropsis Sumachi *Schw.*
Melanconium Ramulorum *Cd.*
Stilbum atrocephalum *Ellis.*
Septosporium velutinum *C. & E.*
Aspergillus pulvinatus *B. & C.*
Chætomium elatum *Kze.*
Peziza raphidospora *Ellis.*
P. macrospora *Fckl.*
P. lachnoderma *Berk.*
P. virginella *Ck.*
P. mycogena *Ellis.*
P. Kalmiæ *Pk.*
Dermatea carnea *C. & E.*
Dermatea tetraspora *Ellis.*
Stictis leucaspis *Ellis.*
Triblidium minor *Ck.*
Diatrype Hystrix *Tode.*
D. fibritecta *C. & E.*
D. collariata *C. & E.*
D. dryophila *Curr.*
Dothidea excavata *C. & E.*
Valsa rufescens *Schw.*
V. aculeans *Schw.*
V. Liquidamberis *Schw.*
V. albofusca *C. & E.*
Sphæria pachyascus *C. & E.*
S. viscosa *C. & E.*
S. Radicum *Schw.*
S. goniostoma *Schw.*

Prof. J. W. CHICKERING, Washington, D. C.

Pinus mitis *Mx.*
Pinus inops *Ait.*

W. M. CANBY, Wilmington, Del.

Pinus Tæda *L.*

F. W. HALL, New Haven, Ct.

Chenopodium leptophyllum *Nutt.*

C. DEVOL, M. D., Albany, N. Y.

Laurus nobilis *L.*

Specimens of wood of .... { Rosa Indica.
Ulmus racemosa?

W. W. HILL, Albany, N. Y.

Specimens of wood of:

Rhus venenata *DC.*
R. typhina *L.*
R. glabra *L.*
Rhus radicans *L.*
Celastrus scandens *L.*

(4.)

SPECIES NOT BEFORE REPORTED.

TRIFOLIUM HYBRIDUM *L.*

Portage. *G. W. Clinton.* North Greenbush. Perhaps not yet fully established.

LONICERA TARTARICA *L.*

I find this shrub growing on the railroad bank, one mile south of Greenbush.

CREPIS AURANTIACA *L.*

Well established in fields and meadows. Sandlake. July.

AGARICUS (TRICHOLOMA) STRIATIFOLIUS *n. sp.*

Pileus dry, convex or expanded, nearly smooth, somewhat shining, often obscurely dotted or squamulose with innate fibrils, grayish or grayish-brown, sometimes tinged with red; lamellæ rather close, rounded behind, transversely striated or venose, white; stem slightly thickened at the base, hollow, white; spores subglobose or broadly elliptical, .00016′*–.0002′ long; odor decided and peculiar, flesh white.

Plant gregarious, 2′ high, pileus 2′–2.5′ broad, stem 3″–5″ thick.

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* One accent signifies inch or inches; two accents signify line or lines.

Ground in woods. Mechanicsville. October.

The striated appearance of the lamellæ is due to the presence of small transverse vein-like elevations. The stem is almost chalky-white. The odor is quite perceptible and peculiar.

AGARICUS (CLITOCYBE) APERTUS *n. sp.*

Pileus convex, then expanded or centrally depressed, often irregular, whitish with a lilac tinge and often one or two darker zones, shining; lamellæ close, adnate or slightly decurrent, whitish, often with a faint pinkish tinge; stem short, equal or narrowed toward the base, solid, whitish; odor farinaceous, taste unpleasant.

Plant gregarious or cæspitose, 1′–2′ high, pileus about 1′ broad, stem 1″ thick.

Grassy ground in pastures and along highways. Maryland, Otsego county. September.

In the dried specimens the lamellæ often assume a pale cinnamon hue.

AGARICUS (CLITOCYBE) FLAVIDELLUS *n. sp.*

Pileus thin, convex, then expanded or centrally depressed, often irregular, hygrophanous, glabrous; lamellæ narrow, crowded, adnate or subdecurrent; stem equal, glabrous, hollow.

Plant gregarious, about 2′ high, pileus 1′ broad, stem 1.5″–2″ thick.

Wet swampy ground. Maryland. September.

The whole plant has a uniform dirty yellowish hue when fresh. The pileus becomes whitish in drying.

AGARICUS (CLITOCYBE) PELTIGERINUS *n. sp.*

Pileus nearly plane, smooth, umbilicate, hygrophanous, brown, striatulate on the margin when moist, whitish or pale-gray when dry; lamellæ rather distant, sometimes branched, venose-connected, decurrent, a little paler than the moist pileus; stem nearly equal, rather firm, solid, smooth, paler than the pileus, often with a minute white tomentum toward the base; spores elliptical, .0003′ long, with a slight apiculus at the base.

Plant 6″–10″ high, pileus 2″–5″ broad, stem less than 1″ thick.

On decaying Peltigera. Oneida. *H. A. Warne.* North Greenbush. May.

A small species remarkable for its peculiar habitat. Sometimes the stems of two or three plants are united at the base, thus manifesting a tendency to become cæspitose.

AGARICUS (COLLYBIA) CONIGENOIDES *Ellis.*

Buried pine cones. West Albany. October.

The pileus in our specimens is fuscous, being darker than in the type. It seems to be near *A. semihærens* B. & C., if not indeed the same species.

AGARICUS (COLLYBIA) DELICATELLUS *n. sp.*

Snowy-white throughout, smooth, subcæspitose; pileus convex or broadly campanulate, submembranaceous, slightly thicker on the disk; lamellæ narrow, close, emarginate; stem slender, equal, hollow, slightly white-villous at the base.

Plant 1′ high, pileus 2″–3″ broad, stem .5″ thick.

Among fallen leaves. North Greenbush. September.

From the character of the lamellæ it is evidently a Collybia but the substance is rather tender.

AGARICUS (MYCENA) ODORIFER *n. sp.*

Pileus thin, hemispherical, convex or expanded, smooth, white, the disk slightly tinged with brown; lamellæ subarcuate, adnate or subdecurrent, somewhat crenulate on the edge, white; stem tough, equal, viscid, smooth, whitish or pale-brownish, white-villous at the base; spores narrowly elliptical, .0002′ long; odor strong, subalkaline, for a long time persistent.

Plant 1′–1.5′ high, pileus 3″–4″ broad.

Mossy ground. Adirondack Mts. July.

Apparently near *A clavicularis* Fr., but smaller and easily known by its decided and peculiar odor which is retained by the dried specimens for a long time.

AGARICUS (PLEUROTUS) SUBAREOLATUS *n. sp.*

Pileus compact, convex, marginate behind, whitish tinged with brown and pink, usually cracking in small maculiform areas; lamellæ rather broad and loose, decurrent, whitish, becoming tinged with yellow in drying; stem eccentric, subvertical, short, curved, firm, solid, sometimes compressed, white; spores white, oblong, .0005′–.0006′ in length.

Pileus 3′–4′ broad.

Trunks of elm trees. Bethlehem. October.

Apparently related to *A. pulvinatus* Pers.

AGARICUS STRIATULUS *Fr.*

Decaying trunks of pine. North Greenbush. October. Buffalo. *Clinton.*

AGARICUS (PLUTEUS) LONGISTRIATUS *n. sp.*

Pileus thin, convex, then expanded, dry, striate to the disk, cinereous, the disk darker and minutely roughened with hairs or squamules ; lamellæ broad, at length ventricose, free, white, then flesh-colored ; stem equal, glabrous, white ; spores orbicular, .0003′ in diameter.

Plant 2′ high, pileus 1′–1.5′ broad, stem 1″ thick.

Decaying wood. Albany. July.

AGARICUS (PHOLIOTA) ANGUSTIPES *n. sp.*

Pileus hemispherical, then convex or expanded, at first brown, then fading to ochraceous-brown or subalutaceous and becoming minutely squamulose with appressed dot-like scales ; lamellæ narrowed outwardly, emarginate, whitish or dull cream color ; stem stuffed, tapering downward, whitish or cinereous, roughened with darker scales which at first form a crenate annulus at the upper part ; spores brownish-ferruginous, subelliptical, .0003′ long, .00018′ broad ; flesh white.

Plant cæspitose, 2′–3′ high, pileus 1.5′–2.5′ broad, stem 2″–3″ thick.

In pastures about old stumps. Schenevus, Otsego county. September.

The pileus is sometimes irregular from being crowded in its growth. The taste is unpleasant and the scales of the stem are somewhat evanescent.

AGARICUS (PHOLIOTA) INDECENS *n. sp.*

Pileus convex, then expanded or centrally depressed, smooth, rather brittle, hygrophanous, pale-fuscous and usually striatulate on the margin when moist, alutaceous inclining to ochraceous when dry ; lamellæ close, emarginate with a decurrent tooth, pale-brown, becoming cinnamon-brown ; stem equal or slightly tapering upward, silky-fibrillose, hollow, annulate, pallid, the thin membranaceous annulus sometimes evanescent; spores unequally elliptical, .0005′–.0006′ long, .00025′–.0003′ broad.

Plant gregarious or cæspitose, 1′–2′ high, pileus 1′–2′ broad, stem 1″–2″ thick.

Ground in bushy pastures. North Greenbush. September.

It resembles somewhat *A. Aggericola* Pk., but it is smaller, paler, not viscid and has longer spores. The edge of the lamellæ is sometimes eroded.

AGARICUS (NAUCORIA) CONTRARIUS *n. sp.*

Pileus thin, convex, then plane or centrally depressed, sometimes umbilicate and striate on the margin, glabrous, alutaceous; lamellæ loose, adnate, very broad behind, becoming ventricose and subtriangular, ochraceous; stem equal, hollow, reddish or reddish-brown, adorned with a few silky-fibrils and minute fragments of the white floccose veil; spores yellow, elliptical, .0003′ long, .0002′ broad.

Plant gregarious or subcæspitose, about 1′ high, pileus 6″–10″ broad.

Grassy ground in pastures. Schenevus and West Albany. September.

The color of the pileus fades a little with age, but the bright color of the lamellæ is retained longer. There is usually an abundant white mycelium at the base of the stem. Often minute fragments of the floccose veil may be seen on the margin of the young pileus.

AGARICUS (STROPHARIA) UMBONATESCENS *n. sp.*

Pileus at first conical, subacute, then expanded and umbonate, smooth, viscid, yellow, the umbo inclining to reddish; lamellæ plane, broad, at length ventricose, blackish-brown with a slight olivaceous tint; stem equal, slender, hollow, generally a little paler than the pileus; spores purplish-brown, almost black, .0006′–.0007′ long, .0004′ broad.

Plant 3′–4′ high, pileus 6″–12″ broad.

Dung in pastures. Schenevus. September.

This is evidently closely allied to *A. stercorarius* and *A. semiglobatus* with which it has probably been confounded, but the pileus in our plant is so peculiar in form that I am constrained to regard it as a distinct species. The viscid pellicle of the pileus is separable. When old it sometimes cracks into areas.

AGARICUS LACRYMABUNDUS *Fr.*

Bushy pastures. Bethlehem. October.

Our specimens do not agree in all respects with the published description of the species. The pileus is sometimes wholly destitute of scales and sometimes densely clothed with hairy erect ones. The species is manifestly variable.

AGARICUS CANDOLLEANUS *Fr.*

Ground and buried chips. North Greenbush and Greig. September and October.

AGARICUS (PSILOCYBE) LIMOPHILUS *n. sp.*

Pileus thin, convex, then expanded, fragile, atomaceous, radiately rugulose, whitish, often splitting on the margin and sometimes cracking into areas; lamellæ rather broad, loose, whitish or pallid, then purplish brown; stem equal, striate and slightly mealy at the top, hollow, short, white; spores elliptical, .0004′–.0005′ long, .0002′–.00025′ broad.

Muddy alluvial soil under willows. Green Island. September.

It is related to *A. incertus* Pk., but the veil is less developed, the lamellæ are more distant and the spores are larger.

AGARICUS (PSILOCYBE) ARENULINUS *n. sp.*

Pileus convex, then expanded, plane or centrally depressed, glabrous, hygrophanous, dark livid-brown and coarsely striatulate when moist, livid-white when dry; lamellæ close, cinnamon-brown, becoming darker with age; stem slightly tapering upward, hollow, whitish; spores subelliptical, .0004′ long.

Plant 1.5′–2.5′ high, pileus 6″–16″ broad, stem 1″ thick.

Sandy soil. West Albany. September.

When moist the pileus has a peculiar radiate appearance as if distantly striate. Large individuals have the margin of the pileus uneven and irregularly striate. A mass of sand usually adheres to the base of the stem.

AGARICUS (PSATHYRA) POLYTRICHOPHILUS *n. sp.*

Pileus thin, convex or subcampanulate, glabrous rather fragile, sometimes with a slight umbo, hygrophanous, striatulate and brown when moist, dull ochraceous or buff when dry, somewhat shining; lamellæ plane and adnate or slightly arcuate and decurrent, broad, subdistant, colored almost like the pileus; stem slender, equal, subflexuous, slightly whitish-fibrillose, especially toward the base, mealy at the top, concolorous, containing a whitish pith; spores purple-brown, subelliptical, .0003′ long, .0002′ broad.

Plant gregarious, odorous, 1′–2′ high, pileus 2″–5″ broad.

Ground among Polytrichum. Oneida. *Warne.* West Albany. May.

AGARICUS (PSATHYRELLA) GRACILOIDES *n. sp.* (Plate 1, figs. 1–4.)

Pileus thin, conical or campanulate, glabrous, hygrophanous, brown and striatulate when moist, whitish and subrugulose when dry; lamellæ ascending, rather broad, subdistant, brown, becoming blackish-brown, the edge whitish; stem long, straight, fragile, hollow, smooth, white; spores blackish, elliptical, .0006′–.00065′ long, .0003′–.00033′ broad.

Plant gregarious, 4′–6′ high, pileus 1′ broad, stem 1″ thick.

Ground in an old door yard. Maryland. September.

This is allied to *A. gracilis* Fr., but the edge of the lamellæ is not rosy. When drying the moisture leaves the disk of the pileus first, the margin last. When dry the plant bears some resemblance to large forms of *A. tener*. Under a lens the texture of the surface of the pileus is seen to be composed of matted fibrils.

CORTINARIUS (PHLEGMACIUM) OPHIOPUS *n. sp.*

Pileus firm, convex or subcampanulate, then expanded, sometimes irregular, viscid, reddish-yellow, smooth, the paler margin sometimes roughened by adhering patches of the whitish veil; lamellæ close, often eroded on the edge, brownish-cinnamon; stem stout, equal, solid, usually much bent or variously curved, at first shaggy-scaly from the subconcentrically arranged fragments of the copious veil, white or yellowish; flesh white; spores unequally elliptical, .00045′–.0005′ long, .00025′–.0003′ broad, usually containing a single nucleus.

Plant 4′–6′ high, pileus 2′–4′ broad, stem 4″–6″ thick.

Among fallen leaves in woods. Maryland. September.

The long crooked stem is a noticeable feature of the species.

CORTINARIUS CRATICIUS *Fr.*

Low grounds. Center. October.

CORTINARIUS (HYDROCYBE) REGULARIS *n. sp.*

Pileus convex or expanded, glabrous, hygrophanous, watery-brown when moist, reddish-ochraceous when dry, often slightly radiate-rugulose; flesh whitish, becoming white when dry; lamellæ close, slightly violaceous when young; stem long, nearly straight, stuffed, slightly tapering upward, silky-fibrillose, white; spores elliptical, .0004′ long, .0003′ broad.

Plant gregarious, 3′–5′ high, pileus 1′–2′ broad, stem 1″–2″ thick.

Sphagnous marsh. Center. October.

The plant has a very regular symmetrical appearance, whence the specific name.

MARASMIUS PRÆACUTUS *Ellis.*

Trunks of dead alder trees. Mechanicsville. October.

The lamellæ are sometimes quite distant and rounded behind. The stem which is remarkable for its thickness and peculiar shape and which constitutes the chief part of the young plant is pulverulent under a lens.

PANUS TORULOSUS *Fr.*

Oak stumps. Greenbush. May.

BOLETUS VISCOSUS *Frost.*

Light sandy soil about pine woods. Center. October.

POLYPORUS OSSEUS *Kalchbr.*

Old stumps in woods. Guilderland. October.

Very rare. The pores in our specimens are a little larger than in an authentic specimen received from *Dr. Kalchbrenner.*

POLYPORUS (ANODERMEI) DUALIS *n. sp.*

Pileus dimidiate, sessile or sometimes produced behind into a stem-like base, convex or nearly plane above, somewhat uneven, rarely with a slight zonate appearance, single or cæspitosely imbricating, two to four inches broad, nearly as long, tawny or tawny-ferruginous, the margin sometimes paler; flesh concolorous, the upper stratum of a soft spongy-tomentose texture, the lower firm and fibrous; pores minute, unequal, more or less angular, with thin dissepiments, whitish and denticulate on the edge, about equal in length to the thickness of the flesh of the pileus, dark ferruginous with a whitish or silvery reflection.

Dead trunks of spruce trees. Adirondack Mts. Also at the base of pine trunks. West Albany. August and September.

The species is remarkable for the twofold character of the substance of the pileus, the upper half being of a soft tomentose nature, velvety to the touch and readily impressed by the finger nail, the lower half of a much firmer fibrous texture, smooth and subshining when cut or fractured. The plants are quite variable in size, shape and thickness of the margin which in some is quite thin, in others very obtuse In the latter the pores near the margin are often much enlarged or elongated so that the dissepiments appear like lamellæ. The species is related to *P. cuticularis* Fr., but I have not found it with any appearance of a cuticle nor of a blackish color, nor with a fimbriated margin — characters said to belong to that species. Besides, that species is attributed to deciduous trees while our plant has thus far occurred on coniferous trees only.

POLYPORUS NIDULANS *Fr.*

Dead oak and birch branches lying on the ground. Sandlake, North Greenbush and Adirondack Mts.

Our specimens are not villous and are fragrant when fresh, not when dry. This would indicate that they should be referred to *P. rutilans*, but the unequal pores forbid such a reference. It is surprising how few of our fungi agree accurately with the descriptions of published species. Either we have many more species peculiar to this country than has been supposed, or else many species have been very imperfectly described.

POLYPORUS (ANODERMEI) FRAGRANS *n. sp.*

Fragrant; pileus fleshy, tough, effuso-reflexed, imbricating, one to two inches long, two to four broad, rather thin but sometimes thickened at the base, velvety to the touch and clothed with a minute innate tomentum, pale reddish-grey or alutaceous, the thin margin concolorous and sometimes a little roughened, often sterile beneath; flesh slightly fibrous, zonate, concolorous; pores minute, unequal angular, about one line long, the dissepiments thin, acute, toothed or lacerated, whitish, becoming darker with age and blackish-stained when bruised.

Decaying trunks of elm trees. Bethlehem. October.

This species is closely related to *P. adustus* and *P. fumosus*, from which it is readily separated by the unequal pores. Its odor when fresh is very decided and quite agreeable, being not much unlike that of dry Seneca grass. The species has been collected in Vermont also by *Mr. A. P. Morgan.*

POLYPORUS (PLACODERMEI) ALBELLUS *n. sp.*

Pileus thick, sessile, convex or subungulate, subsolitary, two to four inches broad, one to one and a half thick, fleshy, rather soft, the adnate cuticle very thin, smooth or sometimes slightly roughened by a slight strigose tomentum, especially toward the margin, whitish tinged more or less with fuscous; flesh pure white, odor acidulous; pores nearly plain, minute, subrotund, about two lines long, white inclining to yellowish, the dissepiments thin, acute; spores minute, cylindrical, curved, white, .00016′–.0002′ long.

Decaying trunks and branches of birch trees. Helderberg Mts. October.

This species appears to be related to *P. paradoxus*, but the texture is manifestly firmer than in that and softer than in *P. betulinus*.

POLYPORUS CONNATUS *Weinm.*

Trunks of maple trees, *Acer saccharinum.* Sandlake. October.

POLYPORUS (INODERMEI) BALSAMEUS *n. sp.*

Pileus rather thin, corky, plain, about one inch broad, sessile or spuriously stipitate, slightly and unequally villose-tomentose, pale-brown marked with lighter concentric zones; flesh white; pores short, minute, subrotund, the thin dissepiments acute, denticulate, white.

Trunks of balsam trees, *Abies balsamea.* Adirondack Mts. August.

The villosity is so slight that it may be easily overlooked. It is not uniformly distributed over the whole surface but occurs in zones or patches. The species is apparently allied to *P. zonatus.*

POLYPORUS OBDUCENS *Pers.*

Decaying wood. Buffalo. June. *Clinton.*

POLYPORUS CALLOSUS *Fr.*

Decaying wood. Buffalo. December. *Clinton.*

POLYPORUS FARINELLUS *Fr.*

Decaying wood. Alexandria Bay. July. *Clinton.*

HYDNUM WEINMANNI *Fr.*

Decaying wood. Bethlehem. October.

IRPEX SINUOSUS *Fr.*

Dead branches lying on the ground. Wynantskill, Rensselaer county. November.

IRPEX FUSCOVIOLACEUS *Fr.*

Decaying trunks of spruce, *Abies nigra.* Adirondack Mts. July.

Our specimens are not "silky," as required by the description, but villose or tomentose-villose as in *Polyporus hirsutus* and *P. abietinus*, the latter of which this species closely resembles. The hymenium, however, is coarser, more highly colored and lamellated to such an extent that young specimens might easily be taken for a Lenzites.

IRPEX OBLIQUUS *Fr.*

On dead oak and alder trees. North Greenbush, Center and Sandlake. October and November.

At first it looks more like a small white orbicular resupinate Polyporus than an Irpex. Very common.

RADULUM ORBICULARE *Fr.*

Decaying wood and bark of deciduous trees. Slingerlands and Mechanicsville. October.

PHLEBIA MERISMOIDES *Fr.*

Decaying wood. Indian Lake. October.
This species is apparently very close to *P. radiata.* Our specimens are referred to it because of their pale color and more strigose margin.

GRANDINIA VIRESCENS *n. sp.*

Effused, thin, separable from the matrix, soft, greenish, becoming darker with age ; granules minute, hemispherical, not crowded ; spores broadly elliptical or suborbicular, .0002′ long.

Decaying wood. Oneida. *Warne.* September.
Remarkable for its beautiful color.

GRANDINIA RUDIS *n. sp.*

Effused, thin, soft, pulverulent-tomentose, tawny-brown, the hymenium at length granulose ; spores globose, rough, .0003′-.0004′ in diameter.

Decaying wood and ground in deep shaded places. North Greenbush. October.
It is allied to *G. coriaria* Pk. in texture and in the character of the spores, but it differs in color and habit. The whole plant is of one uniform hue.

THELEPHORA SPECIOSA *Fr.*

Providence, Saratoga county. August.
But a single specimen was found and in it the tips of the branches are not fimbriate ; otherwise the characters are well shown.

HYMENOCHÆTE AGGLUTINANS *Ellis.*

Trunks and branches of living alder trees. Sandlake and Adirondack Mts. July and November.

HYMENOCHÆTE SPRETA *n. sp.*

Effused, adnate, somewhat uneven, thick, ferruginous, beset with rather long slender acute setæ, at length cracking into frustulate-areolæ.

Decorticated wood. Helderberg Mts. October.
This quite closely resembles some forms of *H. corrugata*, but its bright color and thicker substance, which shrinks more in drying so that the matrix is revealed through the chinks, and the areas become as it were frustules, indicate a distinct species.

The setæ are more slender and more sharp-pointed than in *H. corrugata*.

CORTICIUM QUERCINUM *Pers.*

Dead oak branches. Greenbush. September.

The specimens are a little paler than in the type, but this is probably due to lack of age.

CORTICIUM LACTEUM *Fr.*

Decaying wood. Slingerlands. October.

CORTICIUM SAMBUCI *Fr.*

Dead stems of elder, *Sambucus Canadensis.* Mechanicsville. October.

CORTICIUM CÆRULEUM *Fr.*

Decaying wood. Buffalo. November. *Clinton.*

CORTICIUM MARTIANUM *B. & C.*

Decaying wood. Buffalo. *Clinton.* Mechanicsville. October.

It is not without some hesitation that our specimens are referred to this species, for, though they agree very well with specimens published under this name by *Mr. H. W. Ravenel* and with those distributed by the late *Dr. Curtis*, they do not well agree with the published description of the species. In color they are bright red inclining to cinnabar, the surface often suffused with a slight bloom or pruinosity. The margin on smooth surfaces is obscurely radiately wrinkled, giving the idea of a Phlebia, and this illusion is further sustained by the hymenium in the dried specimens becoming radiately rimose. The substance when fresh is blood red within, and the mycelium is of a beautiful yellow color and penetrates the matrix. It is sometimes confluent, forming patches several inches in extent.

CORTICIUM SUFFOCATUM *n. sp.*

Effused, indeterminate ; subiculum whitish or pale tawny, composed of intricate webby filaments ; hymenium tawny-brown, of a smooth waxy appearance when moist, dusted by the spores and more or less rimose when dry, revealing the paler subiculum through the chinks ; spores elliptical, colored, .0004 long, .0003′ broad.

Under surface of pine and hemlock wood lying on the ground. Sandlake and Bethlehem. November.

CYPHELLA GRISEOPALLIDA *Weinm.*

Bark and twigs lying on the ground. Sandlake. November.

The cups are sometimes furnished with very short stems.

CLAVARIA TYPHULOIDES *n. sp.* (Plate II, figs. 12-14.)

Very small, about two lines high, rather tough, scattered or gregarious, clavate, white, the stem slightly pruinose, gradually swelling into the obtuse glabrous subcompressed solid club; spores oblong-elliptical, .0002'-.0003' long, with an oblique point at the base.

Dead stems of *Epilobium angustifolium*. Adirondack. August.

This belongs to the section *Holocoryne*, and is apparently allied to *C. uncialis*, but its much smaller size and usually compressed club will serve to distinguish it. When dry the white color is well retained and the hymenium has a subpellucid appearance and is of a firmer texture than the center of the club.

CLAVARIA AMETHYSTINA *Bull.*

Ground. Oneida. July. *Warne.*

PISTILLARIA COCCINEA *Cd.*

Dead leaves and petioles of tansy, *Tanacetum vulgare*. Sandlake. June.

TREMELLA INTUMESCENS *Sow.*

Dead alder branches. Sandlake. November.

NÆMATELIA CEREBRIFORMIS *Ellis in litt.*

Dead branches of water-beech, *Carpinus Americana*. Albany. September.

Mr. Ellis sends this under the above name. It appears to differ from *N. encephala* in being lighter colored and in having the nucleus of a softer texture.

DACRYMYCES MINOR *n. sp.*

Small, subglobose, scattered or rarely a few crowded together, dingy ochraceous with a slight olivaceous tint; spores oblong, curved, with a slight oblique apiculus at one end, simple, then uniseptate, finally triseptate, .0005'-.0006' long, .0002' broad.

Decaying wood. Buffalo, *Clinton*. Sandlake. November. The plants are scarcely half a line in diameter.

BOVISTA PILA *B. & C.*

Ground in grassy places. Oneida. *Warne*. Sandlake and Albany.

Our specimens appear to belong to this species but I have never seen them with bits of grass adhering to the peridium, and the spores vary in color from dingy-olivaceous, at first, to purplish brown when old.

LYCOPERDON SACCATUM *Fr.*

Ground. Sandlake and Center. Autumn.

AMAUROCHÆTE ATRA *A. & S.*

Trunks of pine trees. Adirondack Mts. August.

PHYSARUM LUTEOLUM *n. sp.* (Plate 11, figs. 15–18.)

Peridium small, closely gregarious, sessile, yellowish inclining to tawny, rupturing irregularly; flocci abundant, yellowish-white; spores globose, purplish-brown, .0004′ in diameter.

Living leaves of *Cornus Canadensis.* Adirondack Mts. July.

PHYSARUM ALBICANS *n. sp.* (Plate II, figs. 5–8.)

Peridium whitish, fugacious, except at the base, externally mealy with lime granules, globose, as well as the more persistent whitish capillitium; stem white, tapering upwards, sometimes connate at the base, slightly penetrating; spores globose, purplish-brown, .00033′ in diameter.

Bark and mosses. Adirondack Mts. July.

The fragments of the base of the peridium sometimes remain just below the capillitium, surrounding the stem like a calyx or collar. The stem is even and generally longer than the peridium which it penetrates. After the spores have fallen the whitish color of the capillitium becomes apparent. It then resembles a small globose tuft of wool. The plants grew on the branches and mosses of a standing dead birch tree. *Didymium subroseum* is apparently the same species with a pinkish tinge to the peridium.

DIACHÆA SPLENDENS *n. sp.* (Plate 11, figs. 1–4.)

Peridium steel-blue or violaceous, delicate, globose, subpersistent, rupturing irregularly; flocci delicate, colored; stem white, slightly penetrating; spores black in the mass, globose, rough, .0003′–.0004′ in diameter.

Fallen leaves and twigs. North Greenbush. October.

This is a very pretty and distinct species. The globose peridia and rough spores make it easily recognized. It is near *D. elegans* in color, but at once distinguished from it by its globose peridium.

TRICHIA FALLAX *Pers.*

Decaying wood. Oneida. *Warne.* Portville. September.

PERICHÆNA IRREGULARIS *B. & C.*

Bark of decaying sticks. "The Plains." October. *Clinton.*

CLATHROPTYCHIUM RUGULOSUM *Wallr.*

Trunks of poplars. Adirondack Mts. July.
The young plant has a bright flesh-color or orange hue.

NIDULARIA PULVINATA *Schw.*

Old fence boards lying on the ground. Greenbush. October.

LEPTOSTROMA LINEARE *n. sp.*

Perithecia flattened, thin, subangular, at first covered by the epidermis, striated, generally with a sharp elevation or ridge along the center, mostly seriately placed, black; spores slender, oblong, curved, colorless, .0003′-.0004′ long.

Dead stems of *Actæa spicata.* Helderberg Mts. May.

PHOMA STROBILINUM *Peck & Clinton n. sp.*

Perithecia minute, scattered, erumpent, black; spores elliptical or subovate, colorless, .0003′ long.

Cones of *Pinus Strobus.* Buffalo. December. *Clinton.*

PHOMA STERCORARIUM *P. & C.*

Perithecia membranaceous, minute, scattered, black; spores large, elliptical, .0005′-.0006′ long.

Goose dung. Portage. November *Clinton.*
It is highly probable that this is a nonascigerous state of some dung Sphæria. As a Phoma it is remarkable for the large size of the spores.

SPHÆRONEMA ROBINIÆ *B. & C.*

Dead twigs of basswood, *Tilia Americana*, Buffalo. *Clinton.* Catskill Mts. June.

SPHÆRONEMA AURANTIACUM *n. sp.* (Plate II, figs. 9-11.)

Perithecia small, erumpent, hemispherical or subconical, sometimes with a slight papilliform ostiolum, orange; spores oblong-elliptical, colorless, .0003′-.0004′ long, oozing out and forming a whitish or pale cream-colored globule.

Dead bark of *Cornus alternifolia.* Bethlehem. May.
The species is remarkable for its orange-colored perithecia.

SPHÆROPSIS PENNSYLVANICA *B. & C.*

Dead branches of ash trees. Buffalo. February. *Clinton.*

SPHÆROPSIS MINIMA *B. & C.*

Living leaves of red maple, *Acer rubrum.* North Greenbush. June.

The perithecia are epiphyllous, the spores are obovate or subangular and are involved in mucus. The brownish spots frequently have a darker border.

SPHÆROPSIS SYRINGÆ *P. & C. n. sp.*

Perithecia small, scattered, erumpent, black; spores oblong or elliptical, colored, .0008′-.001′ long, .0004 broad.

Dead lilac twigs. Buffalo. January. *Clinton.*

Perhaps this is only a form of *Diplodia Syringæ* Awd.

DIPLODIA THUJINA *P. & C.*

Perithecia subhemispherical or elliptical, rugulose or substriate, black; spores oblong-elliptical, slightly constricted, colored, .0007′-.0009′ long.

Wood and bark of *Thuja occidentalis.* Buffalo. May. *Clinton.*

The form on bark has the perithecia erumpent and closely surrounded by the epidermis. In the other the perithecia are nearly free and often elliptical in shape.

ACROSPERMUM GRAMINUM *Lib.*

Dead stems of grass, *Calamagrostis Canadensis.* West Albany. June.

EXCIPULA LANUGINOSA *n. sp.* (Plate I, figs. 14-18.)

Perithecia small, yellowish or orange, numerous, almost concealed by the long, soft, wooly, dingy-white or pinkish-white hairs; spores oblong, colorless, .0003′-.00035′ long.

Dead stems of melilot. Bethlehem. September.

The species is remarkable for its long, pale, wooly hairs and its light-colored perithecia. These are sometimes so crowded together that they appear to form a continuous fleecy stratum. A relationship with the genus Trichoderma is indicated.

DISCELLA CANADENSIS *n. sp.*

Pustules very small, perithecia obsolete or wholly wanting; spores oozing out in a black mass or in tendrils, oblong or oblong-ovate, .0008′-.001′ long, at first pale, then colored, some of them becoming uniseptate.

Dead branches of *Amelanchier Canadensis.* Center. June.

The subequal hyaline sporophores sometimes remain attached to the young spores. The species approaches the genus Melanconium.

DISCELLA ARIDA *n. sp.*

Perithecia seated on rather large arid grayish spots, minute, flattened, pezizæform, black, at first covered by the epidermis, then forming a ring by the falling away of the center; spores oblong or lanceolate, simple, then uniseptate, colorless, .00035′-.0005′ long.

Living or languishing leaves of *Cassandra calyculata.* Adirondack Mts. August.

The plant might at first sight be taken for a minute black Peziza. The spots usually occur on the apical half or on the margin of the leaf, but sometimes the whole leaf is discolored.

MELANCONIUM INTERMEDIUM *n. sp.*

Spores very irregular, subglobose, ovate, elliptical or oblong, black, about .001′ long.

Dead hickory branches. Buffalo. *Clinton.* Greenbush.

This species is intermediate between *M. oblongum* and *M. magnum*, the spores being larger than in the former, smaller than in the latter.

TORULA CURVATA *n. sp.*

Flocci tufted, elongated, curved or flexuous, here and there slightly constricted, multiseptate, the cells mostly broader than long, the tufts forming an effused black patch.

Dead branches of *Myrica Gale.* Adirondack Mts. August.

SEPTONEMA DICHÆNOIDES *P. & C. n. sp.*

Tufts of flocci minute, clustered in small suborbicular or elliptical patches, black; flocci .0003′-.0004′ thick, at length breaking up into simple or one to two-septate oblong-elliptical spores.

Living alder bark. Olean. May. *Clinton.*

The patches resemble those of *Dichæna faginea.* The species appears to be intermediate between Septonema and Torula.

PUCCINIA ORBICULA *P. & C.*

Uredo form. Spots small, orbicular, yellowish, sometimes tinged with purple; sori circinating, tawny-ochraceous; spores subglobose, .0008′-.001′ in diameter.

Puccinia form. Sori blackish-brown, circinating, often arranged in a single circle on the margin of the spot; spores broadly elliptical, rough, .0013′-.0015′ long, .0008′-.001′ broad.

Petioles and under surface of leaves of Nabalus. Buffalo. *Clinton.* Also on Solidago leaves. Center. May.
The beautiful tawny-ochraceous color of the Uredo form and the circinating sori are noticeable features.

PUCCINIA HYDROPHYLLI *P. & C. n. sp.*

Spots yellow or greenish-yellow; sori small, clustered, sometimes confluent, blackish-brown; spores loose, elliptical, rough, slightly constricted, .001′ long, .0007′–.0008′ broad; pedicel very short, hyaline.

Lower surface of living leaves of *Hydrophyllum Virginianum.* Buffalo. May. *Clinton.*
Related to *P. Menthæ* from which the different habit and very short pedicel will separate it.

UREDO CASSANDRÆ *P. & C. n. sp.*

Spots small, irregular, yellowish or chestnut; sori generally crowded together in small clusters, somewhat angular or irregular, surrounded by the remains of the ruptured epidermis; spores yellow, elliptical ovate or subglobose, roughened, .0008′–.001′ long.

Lower surface of living leaves of *Cassandra calyculata.* Center and Sandlake. June. Machias. *Clinton.*

MELAMPSORA EPILOBII *Fckl.*

Leaves of *Epilobium angustifolium.* Newcomb, Essex county. August.

ÆCIDIUM SANICULÆ *Carm.*

Leaves of Sanicle. Buffalo. *Clinton.*

CLADOSPORIUM DEPRESSUM *B. & Br.* (Plate I, figs. 22–24.)

Living leaves of *Archangelica atropurpurea.* Buffalo. June. *Clinton.*
The spores bear some resemblance to Puccinia spores.

HELMINTHOSPORIUM ABSINTHII *n. sp.* (Plate II, figs. 28–30.)

Flocci forming effused dark-olivaceous or brown patches or minute tufts, simple, septate, colored, subflexuous, irregular or knotty above; spores oblong-clavate, very unequal in length, .001′–.004′ long, one to five-septate, paler than the flocci.

Living leaves of wormwood, *Artemisia Absinthium.* Adirondack, Essex county. August.

On the upper surface of the leaves the flocci form minute tufts, so small as to be easily overlooked. On the lower surface they are more abundant and form effused velvety patches which are quite conspicuous. The spores are extremely abundant, but they fall away so easily that it is difficult to find them in place.

MACROSPORIUM SARCINULA *Berk.*

Decaying squashes. Buffalo. December. *Clinton.*

CLADOSPORIUM NODULOSUM *Cd.*

Dead leaves of sedges. Albany. June.

RAMULARIA BRUNNEA *n. sp.*

Spots brown, unequal, suborbicular, sometimes confluent; flocci occupying the larger spots and giving them an ashy tint, epiphyllous, fasciculate, short, delicate; spores cylindrical, colorless, very unequal in length, .0005′–.0015′ long, .00016′ broad.

Living leaves of colts-foot, *Tussilago Farfara.* The large fertile spots are intermingled with smaller irregular sterile darker-colored ones.

CERCOSPORA SYMPLOCARPI *Pk.* (Thumen's Myc. Univ. No. 669.)

Spots definite, brown, suborbicular; flocci very short, colored, tufted; spores very long, narrow, three to five-septate, paler than the flocci, .003′–.005′ long.

Living leaves of Skunk Cabbage, *Symplocarpus fœtidus.* West Albany and Center. June and July.

CERCOSPORA LEPTOSPERMA *n. sp.*

Flocci tufted, short, hyaline, seated on pale-greenish angular spots; spores colorless, very slender, subfiliform, slightly thicker toward the base where there are usually one or two obscure septa, .003′ long.

Living leaves of sarsaparilla, *Aralia nudicaulis.* Albany.

CERCOSPORA AMPELOPSIDIS *n. sp.*

Spots suborbicular, reddish-brown with a darker margin; flocci hypophyllous, rather long, flexuous, colored, septate; spores slightly colored, subcylindrical, at first simple, then one to three-septate, .001′–.0013′ long.

Living leaves of woodbine, *Ampelopsis quinquefolia.* Bethlehem. July.

CERCOSPORA CHENOPODII *Fckl.*

Living leaves of *Chenopodium album.* West Albany. July.

PERONOSPORA ALTA *Fckl.*

Living leaves of plantain, *Plantago major.* Albany. July. This is sometimes regarded as a form of *P. effusa.*

PERONOSPORA INFESTANS *De By.*

Living leaves of potato vines. Adirondack. August.

This fungus, for a long time considered the cause of the potato disease, has, until recently, baffled all efforts to trace its life-history. But at last Mr. W. G. Smith, an earnest botanist, a most careful observer and skillful experimenter, has succeeded in tracing this history through the yearly cycle. He has found and kept alive through the winter, the hibernating or resting spores of the fungus and caused these to reproduce the pestilent potato fungus. His discovery is so important that I cannot do better than to quote his concluding remarks on the subject, a full account of which is given in the *Gardeners' Chronicle:*

"For more than thirty years our potato crops have been systematically destroyed by two virulent fungi, viz., Peronospora infestans and Fusisporium Solani; these two parasites almost invariably work in company with each other, they suddenly appear for a few weeks, destroy our crops and vanish for ten or twelve months then reappear and repeat the work of destruction. I claim for my work that it is new, and that it has proved how both these fungi hide and sleep through eleven months of the year. As I have kept the resting-spores of both parasites alive artificially in decayed potato leaves in water, in moist air, and in expressed diluted juice of horse dung, it conclusively proves to me that the resting-spores hibernate naturally in the same manner. The seat of danger from both parasites is clearly in dung heaps, ditch sides and decaying potato plants.

"Any method of destroying the resting-spores of these pests, or of warding off or mitigating their attacks, obviously depends in a great measure upon a full knowledge of their life-history. That life-history I have endeavored, to the best of my ability, to watch and describe for the *Gardeners' Chronicle*, and I am content to let the observations stand on their own merits. Sensibly conducted and extensive field experiments might probably teach some valuable lessons, but it is difficult, if not impossible, for any single individual, whether farmer or botanist, to institute and carry out such experiments."

VERTICILLIUM PULVEREUM *P. & C. n. sp.*

Effused, pulverent, dark or snuff-brown; flocci colored, the lower branches alternate, the upper opposite or verticillate, ultimate branchlets short, cylindrical, obtuse; spores abundant, broadly elliptical or subglobose, colored, .00025′-.0003′ long, .0002′-.00025′ broad.

Decaying wood. Alden. November. *Clinton.*
It forms thin dusty patches on the surface of the wood.

POLYACTIS CANA *Berk.*

Decaying cabbage leaves. Buffalo. March. *Clinton.*

TRICHODERMA VIRIDE *Pers.*

Decaying wood. Alden. November. *Clinton.*

DACTYLIUM SUBLUTESCENS *n. sp.*

Tufts pulvinate, sometimes confluent, pinkish-yellow or cream-colored; flocci erect, simple or sparingly and obscurely septate; spores apical, oblong or obovate, uniseptate, .0008′-.0014′ long, sometimes with a blunt point at the base.

Dead branches of alder and poplar trees. Albany and North Greenbush. September.
The species is apparently related to *D. obovatum* Berk. At first sight the tufts appear to be erumpent, but upon closer inspection they are seen to grow upon some effete erumpent Sphæria. In some instances white tufts of more slender branched flocci were associated with the others. Perhaps these are sterile flocci of the same plant.

OIDIUM FASCICULATUM *Berk.*

Decaying oranges and lemons. Buffalo. December. *Clinton.* Albany. July.

OIDIUM ALBIPES *n. sp.*

Flocci forming short white stems supporting subglobose heads of a grayish-brown color, sometimes tinged with green; spores oblong-ovate or lanceolate, pale, .00033′ long, with a slight apiculus at the smaller end.

Decaying wood. Bethlehem. June.

CAPILLARIA SPHÆRIÆ-TYPHINÆ *Cd.*

Parasitic on *Epichloe typhina.* Greenbush. July.

MENISPORA CILIATA *Cd.*

Our specimens do not agree well with the description of this species. The flocci are not "olive-brown" and the spores are cylindrical rather than "fusiform," but as they exhibit the bristle at the extremities of the spores, and agree essentially with European specimens distributed under this name, it seems best thus to refer them.

ZYGODESMUS PANNOSUS *B. & C.*

Decaying wood lying on the ground. North Greenbush. October.

ZYGODESMUS RUBIGINOSUS *n. sp.*

Effused, indeterminate, bright-rubiginous, not granulated, the patches paler toward the margin; spores globose, rough, .0003′ in diameter.

Decaying wood. Greenbush. October.

This resembles *Z. hydnoideus* B. & C. in color, but the absence of a granulated surface and the smaller spores will separate it.

FUSISPORIUM RIMOSUM *n. sp.*

Effused, bright orange or red, at length cracking and revealing through the chinks the white substratum; flocci slender, simple or sparingly branched; spores long, acute at each end, one to three-septate, .0008′–.0018′ long.

Cut ends of corn stalks. Center. October.

The bright color is retained in the dried specimens. In this respect and in the firmer substance and rimose character it differs from its allies.

ERYSIPHE LIRIODENDRI *Schw.*

Leaves of the tulip tree, *Liriodendron Tulipifera.*
Oneida. September. *Warne.*

MORCHELLA BISPORA *Sor.*

Ground among fallen leaves in ravines. Oneida. *Warne.*

The remarkable feature about this species is that there are but two spores in an ascus.

MORCHELLA SEMILIBERA *DC.*

Ground. Oneida. May. *Warne.*

MORCHELLA DELICIOSA *Fr.*

Ground in open fields. Oneida. *Warne.* West Albany. May and June.

This species has a firmer substance, paler color, smoother stem and smaller spores than *M. esculenta.* It is also generally smaller in size and has a more cylindrical pileus, which is sometimes curved.

VERPA DIGITALIFORMIS *Pers.*

Ground. Oneida. May. *Warne.*

PEZIZA SULCATA *Pers.*

Ground. Oneida. *Warne.*

The spores in the specimens are smooth and uninucleate but this may be due to the immaturity of the specimens.

PEZIZA (COCHLEATÆ) WARNEI *n. sp.* (Plate I, figs. 19–21.)

Cups large, 1′–1.5′ broad, at length expanded with the margin often wavy or irregular, externally whitish or pallid, usually lacunose at the narrowed stem-like base; disk brown or ochraceous-brown; asci cylindrical; spores uniseriate, oblong-elliptical, with a short acute point at each end and slightly rough when mature, .001′–.0014′ long, mostly trinucleate, the central nucleus largest.

Hemlock stumps. Oneida. *Warne.* Helderberg Mts. May.

This seems to approach *P. semitosta* B. & C., in some respects, but it differs in its external characters, habitat and spores. Dedicated to *Mr. H. A. Warne.*

PEZIZA BICOLOR *Bull.*

Dead branches of *Myriea Gale.* Adirondack Mts. August.

PEZIZA (DASYSCYPHÆ) MYRICACEA *n. sp.*

Cups small, .02′–.03′ broad when dry, sessile or with a very short stem, tawny-brown or subcervine, densely hairy, expanded when moist and revealing the whitish disk; asci subcylindrical, about .0016′ long; paraphyses as broad as the asci and much longer, tapering above to a sharp point; spores minute, spermatoid.

Dead stems and branches of *Myrica Gale.* Adirondack Mts. August.

The species is related to *P. brunneola* Desm., but is larger and has different hairs. These are very long, not septate nor thickened at the tips. They appear minutely rough under the microscope. When dry, they, with the incurved margin, wholly conceal the disk from view. The spores in our specimens do not seem to be well developed.

PEZIZA (DASYSCYPHÆ) SULPHURELLA *n. sp.*

Pale yellow throughout; cups minute, numerous, stipitate, closed when dry, hairy, the hairs septate, rough, capitate;

asci cylindrical; spores oblong or cylindrical, .0003′ long; paraphyses longer than the asci, tapering above to a point.

Dead stems of *Myrica Gale*. Adirondack Mts. August.

This differs from *P. brunneola* in color and in having a hairy stem. The plant is much smaller than *P. myricacea*.

PEZIZA (DASYSCYPHÆ) CAPITATA *Pk.* (Thumen's Myc. Univ. No. 813.)

Cups minute, sessile, subglobose and usually closed when dry, open when moist, white, clothed with septate capitate white hairs, hymenium whitish inclining to yellow; asci cylindrical, .0012′ long; spores straight, acicular, .0002′–.0003′ long; paraphyses longer than the asci, pointed at the extremities.

Fallen oak leaves. Bethlehem. June.

The specific name has reference to the capitate hairs. These spring directly from the cellular substance of the cup. The base of the hairs is enlarged and distinctly septate. The sessile cups and white color separate this from the next preceding species.

PEZIZA (DASYSCYPHÆ) DISTINCTA *n. sp.* (Plate 1, figs. 9–13.)

Cups small, .03′–.05′ broad, sessile or attached by a mere point, externally blackish, the margin tomentose-hairy, pale-tawny, or olivaceous, the disk pinkish-red when moist, orange when dry; asci clavate, often containing but four spores; spores oblong-fusiform, straight or curved, .0008′–.001′ long.

Dead stems of *Andropogon furcatus*. Center. October.

When dry the margin is inflexed and the cups are then often hysteriiform, the tomentose hairs of the margin concealing the disk and giving the chink an olivaceous or tawny hue.

PEZIZA MACULINCOLA *Schw.*

Decorticated wood. Buffalo. March. *Clinton.*

This is regarded by some as synonymous with *P. flammea* A. & S. *Mr. W. C. Stevenson, Jr.*, to whom I am indebted for many acts of kindness in comparing specimens with the types in Schweinitz's Herbarium, considers the two, as therein represented, to be distinct.

PEZIZA VULPINA *Ck.*

Decaying wood. Buffalo. *Clinton.*

PEZIZA (DASYSCYPHÆ) CHAMÆLEONTINA *n. sp.*

Cups minute, .006′–.015′ broad, at first globose, then expanded with the disk nearly plane, scarcely furfuraceous, white, changing to yellow when bruised, then to pinkish or red, stem short; asci clavate, .001′-.0014′ long; spores crowded, oblong-ovate or subclavate, .0002′ long.

Under surface of hemlock wood lying on the ground. Sandlake. November.

The changes in color, when bruised, is an interesting character. The species is related to *P. hyalina* and perhaps more closely to *P. aspidiicola*, and is therefore placed among the Dasyscyphæ, although there is scarcely any appearance of hairiness on the cups.

PEZIZA (HUMARIA) DELIGATA *n. sp.*

Cups minute, gregarious, sessile, with radiating hyaline fibrils at the base, at first subglobose, then open with the disk nearly plane, brick-red; asci broad, oblong or subcylindrical; spores biseriate, elliptical, smooth, .0006′-.00075′ long.

Dead stems of herbs lying on the ground. Bethlehem. September.

The cups sometimes have a thick tumid margin. In some respects the species resembles *P. hæmastigma.* It appears to belong to the subgenus Humaria, but the habitat is unusual.

PEZIZA POLYGONI *Rehm.*

Dead stems of Polygonum. Albany. July.

PEZIZA MACROSPORA *Fckl.*

Decaying wood. Buffalo. November. *Clinton.*

HELOTIUM CARICINELLUM *n. sp.* (Plate 1, figs. 5-8.)

Small, .02′-.03′ broad, scattered, sessile, reddish or ochraceous-brown when moist, black or blackish when dry, the disk plane or slightly concave; asci clavate; spores crowded, oblong, obtuse, uniseptate, colorless, .0008′-.001′ long.

Dead leaves of *Carex utriculata.* Adirondack. August.

This is a true Helotium as is shown by the cups being open from the first, and yet it is apparently related to *Peziza lacustris.*

HELOTIUM BRYOGENUM *n. sp.*

Cups minute, substipitate, scattered, pallid or yellowish-white and expanded when moist, livid-red or subviolaceous and concave with a tumid margin when dry; spores subfusiform, sometimes curved, .0006′-.0007′ long.

Mosses, *Hypnum delicatulum.* Maryland. September.

DERMATEA CARPINEA *Fr.*

Dead branches of Carpinus. Buffalo. *Clinton.* Albany. October.

DERMATEA INCLUSA *n. sp.*

Minute, scattered, erumpent, sessile, closely surrounded by the ruptured epidermis, margined, the margin mealy or furfuraceous, the disk plane or concave, subochraceous; asci broad, oblong-cylindrical; spores large, biseriate or crowded, oblong-elliptical, sometimes slightly curved, simple, colorless, .0011′–.0014′ long.

Dead trunks of willows. Maryland. September.

The cups scarcely rise above the ruptured epidermis that invests them. When moistened or crushed on the slide of the microscope the substance appears to be of a rhubarb color. The species therefore has some little relationship to *Patellaria rhabarbarina.* The spores sometimes contain a single large nucleus, sometimes three or four small ones and sometimes a mass of granular endochrome.

PATELLARIA LEPTOSPERMA *n. sp.*

Black, stipitate; receptacle plane, the margin narrow or obliterated, about one line broad, externally subscabrous; stem about one line high, scabrous, often longitudinally wrinkled when dry; asci cylindrical or clavate; spores biseriate, slender, elongated, cylindrical, multinucleate or obscurely multiseptate, .0016′–.003′ long; paraphyses very slender, filiform, capitate.

Dead bark of maple, *Acer saccharinum.* Oneida. *Warne.* Buffalo. *Clinton.*

The number of the nuclei is from ten to sixteen.

PATELLARIA LIGNYOTA *Fr.*

Decaying wood. Angola. May. *Clinton.*

TYMPANIS TURBINATA *Schw.*

Dead stems of bush honeysuckle, *Diervilla trifida.* Center. May.

ASCOBOLUS VIRIDIS *Curr.*

Alluvial soil. Albany. June.

ASCOBOLUS CRENULATUS *Karst.*

Cow dung. Oneida. *Warne.* Helderberg Mts. May.

STICTIS (PROPOLIS) CYLINDRICARPA *n. sp.*

Immersed, minute, erumpent, closely surrounded by the ruptured epidermis, the whitish margin toothed or laciniated, the disk plane, greenish-olivaceous; spores crowded, cylindrical, straight or curved, obtuse, colorless, .0007′–.0008′ long, .00015′ broad, sometimes obscurely two to three septate.

Dead bark of willows. Maryland. September.

This occurred in company with *Dermatea inclusa.* Its relationship is with *Stictis versicolor*, of which it may yet prove to be a minute variety.

HYSTERIUM AUSTRALE *Duby.*

Dead grape-vines. Poughkeepsie. *W. R. Gerard.*

HYSTERIUM TRUNCATULUM *C. & P.*

Decaying wood. Buffalo. *Clinton.*

The spores are of the same character as those of *Hysterium pulicare*, differing only in their larger size.

HYSTERIUM ELLIPTICUM *DC.*

Hickory bark. Poughkeepsie. *Gerard.*

HYSTERIUM THUIARUM *C. & P.*

Bark of *Thuja occidentalis*. New Baltimore. *E. C. Howe, M. D.*

HYSTERIUM (GLONIUM) PARVULUM *Ger.*

Decaying wood. Poughkeepsie. *Gerard.*

HYSTERIUM (GLONIUM) SIMULANS *Ger.*

Decaying wood. Poughkeepsie. *Gerard.* North Greenbush.

HYPODERMA DESMAZIERII *Duby.*

Fallen pine leaves. Poughkeepsie. *Gerard.* Sandlake. July.

HYPOMYCES OCHRACEUS *Tul.*

Decaying Polyporus. Helderberg Mts. May.

HYPOXYLON SUBORBICULARE *n. sp.*

Stroma thin, flattened, erumpent, suborbicular, surrounded by the ruptured epidermis, growing from the inner bark, purplish-brown, then black, the surface slightly uneven as if areolate-rimose; perithecia monostichous, subglobose; ostiola sunken, perforate, sometimes whitish ; spores unequally elliptical, colored, .0004′–.0005′ long.

Maple bark, *Acer saccharinum.* Sandlake. November.
This species is apparently allied to *H. Laschii* Nke., and approaches in some respects species of Nummularia.

DOTHIDEA RIMINCOLA *Schw.*

Dead twigs of *Diervilla trifida.* Buffalo. *Clinton.*
I fail to see why Schweinitz referred this fungus to the genus Hysterium since there is no chink or linear opening in any of the specimens that have come under my inspection.

DOTHIDEA EPISPHÆRIA *n. sp.*

Stroma small, slightly prominent, scattered or subconfluent, often irregular, carbonaceous, black ; nuclei numerous, white within ; spores crowded or biseriate, lanceolate or subfusiform, colorless, .0006′–.0007′ long.

Effete *Diatrype stigma.* Maryland. September.
The spores may possibly be uniseptate when fully mature. Those examined are not clearly septate.

DOTHIDEA CARICIS *Fr.*

Dead leaves of *Carex Pennsylvanica.* West Albany. June.

DOTHIDEA OSMUNDÆ *P. & C. n. sp.*

Minute, linear, innate, erumpent through a narrow chink, scarcely emergent, black, nuclei whitish ; asci subcylindrical ; spores narrow, oblong, uniseptate, slightly constricted, colorless, .00065′ long, one cell usually a little swollen at the septum.

Dead stems of Osmunda. Buffalo. *Clinton.* Sandlake. June.
Authors do not all agree in the characters they ascribe to the spores of *Dothidea filicina*, one describing them as "elliptical uniseptate," another as "triseptate." Neither of these descriptions will apply to the spores of the species just characterized. The Dothidea which I find on *Pteris aquilina*, the habitat assigned to *D. filicina*, has the spores triseptate.

DIATRYPE FERRUGINEA *Fr.*

Dead branches of birch, *Betula lutea.* Sandlake. August.

VALSA JUGLANDICOLA *Schw.*

Dead hickory branches. Buffalo. December. *Clinton.* West Troy. June.

VALSA (OBVALLATA) INNUMERABILIS *n. sp.*

Pustules small, very numerous, generally crowded and seriately placed : perithecia four to ten, nestling in the inner bark ; ostiola short, crowded, quadrisulcate, black ; spores crowded, cylindrical, curved, obtuse, slightly colored, .0004′ long.

Dead elm branches. Greenbush. May.
On the smaller twigs the pustules are more scattered and not arranged in lines.

CUCURBITARIA BERBERIDIS *Gr.*

Dead stems of barberry, *Berberis vulgaris*. Buffalo. December. *Clinton.*

LOPHIOSTOMA OBTECTUM *n. sp.*

Perithecia numerous, immersed, slightly elevated, covered by the epidermis which is pierced by the narrow compressed ostiola : asci cylindrical or clavate ; spores variable, crowded or biseriate, rarely uniseriate, at first pale, subacute and one to three-septate, then obtuse, oblong or subfusiform, five or six-septate, colored, .001′–.0014′ long, usually constricted at the septa and occasionally with longitudinal septa.

Dead branches of prickly ash, *Xanthoxylum Americanum*. Bethlehem. July.
Apparently allied to *L. bicuspidata* Ck., but I can detect no hyaline beaks at the extremities of the young spores.

SPHÆRIA (VILLOSÆ) CLINTONII *n. sp.* (Plate II, figs. 19–23.)

Perithecia very small, .005′–.006′ broad, subglobose, gregarious, black, clothed with erect, black, bristly hairs ; spores fusiform, multinucleate, then five to seven-septate, colorless, .0016′–.0018′ long.

Decaying wood. Alden. November. *Clinton.*
Related to *S. scopula* C. & P., from which it differs in its smaller perithecia, and broader spores with fewer septa.

SPHÆRIA XESTOTHELE *B. & C.*

Birch bark. Oneida. *Warne.*

SPHÆRIA (DENUDATÆ) EXIGUA *C. & P.*

Perithecia subgregarious, small, .013′ broad, globose, sometimes collapsed, smooth, shining, black, papillate ; asci clavate or cylindrical ; spores elliptical, binucleate, then one to three-septate, hyaline, .0006′–.0007′ long, .0003′ broad.

Decaying wood. Richfield Springs. July. *Clinton.*

SPHÆRIA CLASTERIUM *B. & C.*

Bark of *Spiræa opulifolia.* West Albany. October.

The spores in our specimens as well as in those received from Dr. Curtis are colored, .0005′-.0006′ long, with a long colorless appendage at each end.

A non-ascigerous state occurred in May in the same locality. The perithecia and spores were the same, but I could detect no asci.

SPHÆRIA (OBTECTÆ) SPHÆRELLULA *n. sp.*

Perithecia minute, scattered or seriately placed, covered by the epidermis which is at length ruptured ; asci broad, obtuse, gradually narrowed above, suddenly contracted at the base ; spores crowded, fusiform, uniseptate, hyaline, .0005′-.0006′ long.

Dead bleached twigs of striped maple, *Acer Pennsylvanicum.* Catskill Mts. June.

The asci imitate in form those of some species of Sphærella.

SPHÆRIA (CAULICOLÆ) EXERCITALIS *n. sp.*

Perithecia minute, crowded, arranged in long lines, at first covered by the epidermis which at length is ruptured in long chinks ; ostiola prominent, subcylindrical, blunt or subacute ; asci-subcylindrical ; spores oblong or subfusiform, quadrinucleate, colorless, .0005′ long.

Dead stems of herbs. Catskill Mts. June.

The species is remarkable for the long lines of perithecia and the prominent ostiola which are suggestive of lines of armed men.

SPHÆRIA (CAULICOLÆ) VIRIDELLA *n. sp.*

Perithecia small, gregarious, seated on a greenish spot, covered by the epidermis which is ruptured by the minute ostiola ; asci cylindrical ; spores oblong-fusiform, sometimes curved, triseptate, greenish, .001′ long, the third cell from the base swollen.

Dead stems of melilot. Bethlehem. September.

The marked feature of the species is the greenish color of the spot and of the spores. The latter resemble those of *S. subconica* C. & P., except in color.

SPHÆRIA (CAULICOLÆ) SCAPOPHILA *n. sp.* (Plate II, figs. 24-27.)

Perithecia minute, subglobose, scattered, covered by the epidermis which is ruptured by the minute perforated ostiola ;

asci cylindrical; spores crowded or biseriate, subcylindrical, yellowish, .001′-.0012′ long, seven-septate, one apical and three basal cells longer than the others.

Dead scapes of the pitcher plant, *Sarracenia purpurea*. Adirondack Mts. August.

SPHÆRIA (CAULICOLÆ) ONOSMODINA *P. & C. n. sp.*

Perithecia numerous, minute, at first covered by the epidermis, then exposed, depressed, black; ostiola pierced; asci cylindrical; spores crowded or biseriate, oblong-elliptical, uniseptate, colorless, .0006′-.0007′ long, the cells usually unequal.

Dead stems of *Onosmodium Carolinianum*. Buffalo. June. *Clinton.*

SPHÆRIA HERBARUM *Pers.*

Dead stems of *Scirpus validus*. Buffalo. June. *Clinton.*

SPHÆRELLA VACCINII *Ck.*

Fallen leaves of *Vaccinium corymbosum*. Center. May.

SPHÆRELLA IMPATIENTIS *P. & C. n. sp.*

Perithecia abundant, minute, black; asci subcylindrical; spores crowded, oblong or lanceolate, uniseptate, usually quadrinucleate, .0005′ long.

Living or languishing leaves of touch-me-not, *Impatiens fulva*. Buffalo. *Clinton.* Adirondack Mts. June to August.

PYRENOPHORA PHÆOCOMES *Fr.*

Dead grass. Sandlake. June.

(5.)

REMARKS AND OBSERVATIONS.

VIOLA SELKIRKII *Pursh.*

Oneida. According to Mr. Warne's observations the flowering period of this plant continues considerably longer than the time indicated in Paine's Catalogue.

DROSERA LONGIFOLIA *L.*

A dwarf form, bearing but a single terminal flower, occurs at Calamity Pond, Adirondack Mts.

RHUS COPALLINA *L.*

Green Island and Center.

RHUS VENENATA *DC.*

Not uncommon in swampy places about Albany. It is generally supposed that the poisonous properties of this plant are to be dreaded only while the tree is living, but several cases have been reported to me in which persons were severely poisoned from using the wood as fuel.

UTRICULARIA RESUPINATA *Green.*

Shallow water along the shores of Lake Jimmy and Lake Sallie, Adirondack Mts. August.

ATRIPLEX PATULA *L.*

This is evidently spreading and becoming quite common about Albany.

PINUS RESINOSA *Ait.*

Portage. *Clinton.* A beautiful grove of young trees of this species occurs at Long Lake, Hamilton county. I have seen it at Center, in Sandlake, on the Catskill and the Helderberg mountains and in several places in the northern counties where it is by no means rare. The cones, so far as I have observed, are not always deciduous after the falling of the seed, nor are they terminal except when quite young, the prolongation of the branch soon rendering them lateral. Frequently two and sometimes three generations of fully developed cones may be seen on a branch at one time. The species may be separated from *Pinus mitis* by the absence of prickles on the cone scales and by the longer leaves which occur only in pairs.

PINUS BANKSIANA *Lambert.*

Having compared southern specimens of *Pinus inops* Ait. with the New York specimens formerly reported as *P. inops*, I am satisfied that the latter should be referred to *P. Banksiana*, notwithstanding the presence of prickles on the cones. In these specimens the cones are one to one inch and a half in length, and the prickles are very short, weak and obscure, and on some of the scales are wanting. In the southern specimens the cones are two inches in length and the prickles are stout and very distinct on all the scales. The leaves in both are of the same length, but less dense in the southern specimens.

It is possible that *P. inops* and also *P. mitis*, which Dr. Torrey reported, on the authority of Michaux, as occurring near Albany, may occur in the southern part of the State or on Long Island. At present we can claim positively only the four species, *P. Strobus*, *P. rigida*, *P. resinosa* and *P. Banksiana*. The last one is not known to me to occur anywhere in the State except in Essex county where it was first detected by *Dr. G. T. Stevens*.

The four New York species may be tabulated in such a way as to be easily identified by any one possessing a branch bearing either leaves or cones ; thus,

Leaves.

Five leaves in a cluster	White Pine,	Pinus Strobus *L.*
Three leaves in a cluster	Pitch Pine	Pinus rigida *Mill.*
Two leaves in a cluster, 3-6 inches long	Red Pine	Pinus resinosa *Ait.*
Two leaves in a cluster, 1-2 inches long	Scrub Pine	Pinus Banksiana *Lamb.*

Cones.

Cones cylindrical, scales unarmed	Pinus Strobus *L.*
Cones ovate conical, scales tipped with a stout prickle	Pinus rigida *Mill.*
Cones ovate-conical, scales unarmed	Pinus resinosa *Ait.*
Cones oblong-conical, usually curved, prickles none or weak	Pinus Banksiana *Lamb.*

Sparganium minimum *Bauhin.*

This rare species occurs in a pond near Newcomb, Essex county.

Potamogeton natans *L.* var. prolixus *Koch.*

Lake Sanford, Essex county, with the normal form. The stem is much prolonged beyond the insertion of the peduncle which thus becomes lateral.

Smilax hispida *Muhl.*

In a large swamp south of Catskill. No fertile plants were found.

ELEOCHARIS ROBBINSII *Oakes.*

Lake Harris and Lake Jimmy, Essex county. At the latter lake it is associated with *Utricularia resupinate* and *Myriophyllum tenellum.* I have recently received these three species from Long Island.

SCIRPUS SUBTERMINALIS *Torr.*

Lake Harris and Lake Jimmy. The former lake affords a variety of water plants, including *Brasenia peltata, Nymphæa odorata, Nuphar advena, N. Kalmiana, Potamogeton natans, P. Claytonii, P. perfoliatus* and *P. pectinatus.*

SCIRPUS PAUCIFLORUS *Light.*

Newcomb. July.

ERIOPHORUM GRACILE *Koch.*

Mud Pond near Long Lake. July.

AGARICUS DETERSIBILIS *Pk.*

I find that this name is preoccupied and must therefore be changed. I would substitute for it *Agaricus erinaceëllus* Pk.

AGARICUS JOHNSONIANUS *Pk.*

This species occurred the past season in the original locality. I had not seen it till then since its discovery in 1869.

AGARICUS (CREPIDOTUS) VERSUTUS *n. sp.*

Pileus at first resupinate, then reflexed, sessile, thin, pure white, covered by a soft downy villosity, the margin incurved; lamellæ rather broad and subdistant, terminating in an eccentric point, rounded behind, pale, then ferruginous; stem none; spores ferruginous-brown, subelliptical, .0004′ long.

Plant gregarious, 4″–10″ broad.

Much decayed half-buried wood, vegetable mold and even rocks.

This plant was reported under the name *A. chimonophilus* B. & Br., but it is evidently a distinct species. It loves very damp shaded places, frequently growing in cavities and on half buried wood, as if avoiding the light. The villosity is of a peculiar soft and delicate character and is easily destroyed by handling the specimens.

CORTINARIUS COMMUNIS *Pk.*

The spores of this plant have a dull brownish tinge, unlike those of true Cortinarii and much like those of some species of Pholiota. I have also found it growing from buried pine chips, another point of affinity with Pholiota. Still, the absence of an annulus and the arachnoid character of the veil seem to forbid its reference to this subgenus.

PANUS DORSALIS *Bosc.*

The form that occurs here does not well agree with the description of the species. It has no stem and is of a buff or pale-yellow color. The cuticle does not break up into "floccose scales," but the pileus is strigose-hairy, especially toward the margin. The spores are of a beautiful fleshy-pink color like the lamellæ of young *Agaricus campestris.* It grows on beech and birch. I have not found it on pine. If the type is accurately described, our plant ought at least to be considered a distinct variety.

PANUS OPERCULATUS *B. & C.*

It is not rare on alder trunks and branches, but the veil or operculum is generally very fugacious, so that it is rarely seen except in very young plants.

LENZITES SEPIARIA VAR. POROSA.

This remarkable variety was detected at Long Lake, in Hamilton county. The whole hymenium is porous so that the plant might easily be taken for a species of Polyporus. All the specimens found on a single pine trunk were of this character.

LENZITES COOKEI *Berk.*

The opinion has somewhere been expressed that *Dædalea confragosa* and *Trametes rubescens* are one species. I am disposed not only to adopt this opinion, but also to add to these synonyms *Lenzites Cookei*, *L. Cratægi*, *L. proxima* and possibly *L. Klotzschii.* Excepting the last one, of which I have seen no diagnosis, the descriptions of these so-called species are all applicable to a single fungus common with us. Neither description covers all the forms of the fungus, each is applicable to one or another of its forms. Indeed, so wonderfully variable and comprehensive is this *L. Cookei*, of which scarcely more than a two-line description was given, that not only does it exhibit all the essential characters of the five species named, but its hymenium, utterly regardless of the generic limitations of the books, assumes the hymenial characters of four genera even, viz.: Lenzites, Dædalea, Trametes and Polyporus. A species so comprehensive in its characters certainly deserves a more extended notice than any yet given to it.

It generally grows singly and stemless, but in rare instances I have seen it clustered and with a stem-like base. When growing upon large trunks, the pileus is nearly semiorbicular;

but when growing upon small trunks or branches, which seem to be a favorite habitat, and which it partly surrounds or clasps by its base, it becomes somewhat reniform. Sometimes it is quite orbicular, in which case it usually occurs on the under side of a branch to which it is attached by its vertex, or on the upper side to which it is attached by an eccentric or the central point of the hymenium. It is normally and repeatedly zonate and more or less sulcate, with the zones usually quite narrow and not differing very much in color from the general hue of the pileus. Slight radiating rugæ or elevations are generally present, and these, in passing over the furrows, sometimes render the surface rough or scabrous. This roughness is occasionally increased to such an extent that the surface becomes very uneven, especially toward the base. Not very rarely a kind of tough appressed and at length hardened and glabrated tomentum overspreads a part or the whole of the pileus and thus conceals to a greater or less extent the zones and radiations. This coating can sometimes be separated from the pileus in scales or flakes like a kind of crust. It is most often limited to the basal or central portions of the pileus. Its unequal distribution gives a rough and unnatural appearance to the plant. In some specimens the pileus is dull and opaque, in others it is smooth and shining. In size it occurs from half an inch to three and a half inches in diameter. The substance is usually rather thin, sometimes much thinner than the hymenium. The upper surface is plane or slightly convex, though specimens are not wanting in which the pileus is much thickened behind so that it approaches an ungulate form. I have seen it in different individuals both umbonate and depressed at the base, but these are rare and exceptional forms. In color there is considerable diversity, some specimens being whitish, or gray, others having a dark reddish-brown or chestnut color. Between these extremes there is a great variety of intermediate hues, but a kind of pallid wood-color, more or less tinged with rufous or cervine hues, prevails. The thin margin is usually concolorous, but sometimes in pale specimens it is more highly colored than the rest. Occasionally the whole plant assumes a ruddy hue in drying. The substance has a color similar to that of the surface of the pileus, but in dark specimens it is a little paler.

The hymenium varies if possible more than the hymenophore. There are four typical forms which for convenience may be called *lenzitoid*, *dædaleoid*, *trametoid* and *polyporoid*. In the first the dissepiments are lamellæ, here and there forked or dichotomously branched and sometimes slightly anastomosing, especially at the base. Such specimens would be referred to *Lenzites*. In the second the pores are unequal, some of them elongated and flexuous or labyrinthiform. Such specimens belong to *Dædalea*. In the third, rotund and straight elongated pores are intermingled and generally arranged in a radiating manner. These belong to *Trametes*. In the fourth the pores are equal, or nearly so, and rotund or subrotund. So far as the external characters are concerned, these would be referred to the genus *Polyporus*. Specimens representing all these forms are before me as I write, and yet I can only believe that they are all forms of one species. For besides these marked types all kinds of intermediate connecting links occur among the scores of specimens that I have collected from various localities. What shall we say of the generic distinctions that are thus swept away by a single species? In which genus shall we place our protean plant? But its characters are not yet fully recorded. In the fresh growing state the dissepiments are thick obtuse and covered with a whitish pruinosity which gives the hymenium a whitish or cinereous appearance, but with advancing age this pruinosity disappears, the dissepiments become thinner and the color becomes darker, sometimes even darker than the surface of the pileus. They at last become toothed or lacerated and lamellated, so that what at first was *trametoid* often in old age becomes *lenzitoid*. If a horizontal section of such a lenzitoid hymenium be made it will be found that near the hymenophore the hymenium is still trametoid, and that there the dissepiments are still thick and firm and the pores distinct. The surface of the hymenium varies from slightly concave to very convex. Most often it is nearly plane or somewhat sloping or deepened toward the base. Not infrequently it is slightly decurrent at the base.

I have found the plant growing on oak, willow, birches and alders. It matures in autumn.

Such are the prominent characters of this remarkable fungus, which probably includes at least five so-called species. Three of these are described as being, sometimes at least, radiate-rugulose or radiate-striate, and always zonate. Another is described as scabrous and subzonate. These characters are present in our plant. So also are the various modifications of the hymenium which determine the three genera to which these five supposed species have been referred. The texture ascribed to them all is essentially the same and the special features of each are exhibited in one or another of the various forms of our plant. I would therefore group the following as forms of one species so far as can be ascertained from the published descriptions:

Dædalea confragosa Pers. which is represented by forms of our plant having a scabrous somewhat zoned pileus of a reddish-brown color and a dædaleoid hymenium.

Our specimens exhibit these characters combined, except the color which is paler.

Trametes rubescens A. & S. which is represented by forms that assume the ruddy color and have the trametoid hymenium. We have such specimens.

Lenzites Cratægi Berk. which is represented by forms having a shining pileus attached by the vertex and having a trameto-lenzitoid hymenium.

Our specimens illustrate this also with the bare exception that the pileus is not shining.

Lenzites Cookei Berk. which is represented by forms with the pileus of a cervine hue and with a trameto-lenzitoid hymenium. Our specimens of course accord with this since we have those from which the types were taken.

Lenzites proxima Berk. should also be added to this list of supposed synonyms. I have a single specimen which accords very well with the description of that plant, but it is really only a form of the same protean fungus with the thin flattened pileus completely overspread by the peculiar tomentum previously described.

Also the form with the polyporoid hymenium agrees remarkably well with a specimen received from Dr. Curtis and labeled by him "*Lenzites Klotzschii* Berk." Of this species I have seen no description.

The form with the purely lenzitoid hymenium coincides to a great extent with the description of *Lenzites tricolor* Fr., but the pileus is not "gibbous at the base" nor "scabrous-tomentose," neither does it agree in color, so that the two are perhaps distinct, though my Curtisian specimens of L. tricolor are clearly a form of this protean fungus.

Another remarkable form which corresponds to no description that I have seen has the pileus plane or depressed above with the hymenium very decurrent and wholly porous. The pileus is sometimes so much reduced that the whole plant appears like a pulvinate mass of pores. The pores are much smaller in this than in any other form that I have seen. The whole plant has a singular deformed appearance utterly unlike any of the other forms, and yet no one familiar with the various aspects of the species would think of separating this from the others.

That my views of the synonymy of the various forms of this plant will prove to be well founded I have no doubt, and that they will in that case render necessary the application of some single name to the species and a recasting or modification of the present characters of the genera Lenzites, Dædalea and Trametes is evident. Doubtless the oldest specific name "*confragosa*" should be retained, no matter in what genus the plant may ultimately be placed, although some such name as "*variabilis*" might be more appropriate and expressive. The other specific names might be retained to designate their respective forms as varieties. Thus the form known as *Trametes rubescens* would become *Dædalea confragosa* var. *rubescens*.

BOLETUS CLINTONIANUS *Pk.*

This rare species, heretofore found in one locality only, was detected the past season at Center, near Albany, where it was growing in company with *Boletus ampliporus*. The recurrence of fungi after long intervals and especially in widely separated localities is an interesting and remarkable feature in these singular plants.

POLYPORUS NIGROPURPURASCENS *Schw.*

A resupinate form was found on elm in Bethlehem. In some of these specimens the hymenium was much paler than is usual in this species. The pores are seated on a thin but tough elastic membrane which is separable from the substance of the pileus.

STEREUM BALSAMEUM *Pk.*

The hymenium in this becomes red or blood-stained where wounded as in *S. sanguinolentum.* Its general color is darker than in that species.

STEREUM PURPUREUM *Fr.*

I find this a very variable plant. One form has the hymenium very pale with only a slight purplish tint. Another has the pileus zoneless and when moist it is darker than when dry.

CORYNEUM CLAVÆSPORUM *Pk.*

This proves to be the same as *Exosporium Tiliæ* Lk. I have never been able to find it with flocci and therefore doubt if it should be referred to the genus Helminthosporium as some authors think.

PUCCINIA HIERACII *Mart.*

Mr. M. Ruger sends specimens of a Puccinia found on leaves of hawkweed, at Woodhaven, L. I., which should perhaps be referred to this species, but I fail to find any good mark of distinction between it and *P. variabilis.*

PUCCINIA AMPHIBII *Fckl.*

This is now regarded as distinct from *P. Polygonorum*, and our specimens of Puccinia on leaves of *P. amphibium* should be referred to it.

USTILAGO URCEOLORUM *Tul.*

This occurs in the Adirondack region on *Carex stricta*, *C. stellulata*, *C. crinita*, *C. utriculata* and *C. oligosperma.*

TRICHOBASIS HOWEI *Pk.*

I would change this name to *Uromyces Howei* Pk. since I find that the pedicels, though very short and obscure, are permanent.

ÆCIDIUM PYROLATUM *Schw.*

This seems to be one of the connecting links between Æcidium and Uredo. Leaves affected by it are more erect than the others and have a pale sickly appearance, so that it is not difficult, in looking at a patch of the round leaved Pyrola, to tell at a glance what leaves are affected by the fungus.

ÆCIDIUM EUPHORBIÆ *Pers.*

This species occurs quite commonly some seasons on *Euphorbia maculata* in company with *Uromyces Euphorbiæ.* The branches whose leaves are affected by it are more erect than the others and more slender in their mode of growth.

NECTRIA PULICARIS *Tul.*

The spores in this species are described in the Handbook of British Fungi as "elliptical or pyriform." In the fungus inhabiting old corn-stalks and referred by some botanists to this species, the spores are oblong-fusiform.

XYLARIA DIGITATA *Grev.*

A Xylaria occurs quite frequently in our woods which has the smooth stem of this species and the short spores of *X. Hypoxylon*, thus ranking intermediate between the two. I am not fully satisfied whether it should be considered a distinct species or a variety of one or the other. The true *X. digitata* is quite rare in our State.

RHYTISMA LINEARE *Pk.*

This should be referred to the genus Hypoderma. It is, however, quite distinct from *H. nervisequum* to which one writer has referred it.

HYSTERIUM CLAVISPORUM *C. & P.*

I have never been able to detect the narrow linear orifice of the genus Hysterium in this species. In my opinion it belongs rather to the genus Dothidea. The same may also be said of *Hysterium Rimincola* Schw.

DOTHIDEA DALIBARDÆ *Pk.*

This rare species has occurred near Mud Pond in Hamilton county.

VALSA RUFESCENS *Schw.*

Mr. J. B. Ellis informs me that the specimens of this plant in the Schweinitzian Herbarium have simple cylindrical spores, .0003′–.0004′ long. This would make it distinct from *V. aculeans* Schw. with which it has sometimes been confused.

SPHÆRIA COLLINSII *Schw.*

This occurs in the Adirondack region on leaves of *Spiræa salicifolia.* The branches in this as in *Amelanchier Canadensis* are swollen and distorted by the fungus.

VENTURIA MACULANS *Pk.*

I am satisfied that this is only a form of *Sphæria ditricha* Fr., a species which has been referred to Sphærella, though in my opinion it is a good Venturia.

The following list of parasitic fungi and their host plants is additional to the one given in the preceding report:

Puccinia orbicula *P. & C.*	inhabits	Solidago arguta *Ait.*
P. Hydrophylli *P. & C.*	"	Hydrophyllum Virginicum *L.*
P. Hieracii *Mart.*	"	Hieracium Canadense *Mx.*
Urocystis pompholygodes *Schl.*	"	Anemone nemorosa *L.*
Ustilago urceolorum *Tul.*	"	Carex stricta *Lam.* C. stellulata *L.* C. crinita *Lam.* C. utriculata *Boott.* C. oligosperma *Mx.*
Melampsora Epilobii *Fckl.*	"	Epilobium angustifolium *L.*
Uredo Cassandræ *P. & C.*	"	Cassandra calyculata *Don.*
Discella arida *Pk.*	"	Cassandra calyculata *Don.*
Sphæropsis minima *B. & C.*	"	Acer rubrum *L.*
Helminthosporium Absinthii *Pk.*	"	Artemisia Absinthium *L.*
Cladosporium depressum *B. & Br.*	"	Archangelica atropurpurea *Hoffm.*
Ramularia brunnea *Pk.*	"	Tussilago Farfara *L.*
Cystopus cubicus *Mart.*	"	Ambrosia artemisiæfolia *L.*
Cercospora Symplocarpi *Pk.*	"	Symplocarpus fœtidus *Salisb.*
C. leptosperma *Pk.*	"	Aralia nudicaulis *L.*
C. Ampelopsidis *Pk.*	"	Ampelopsis quinquefolia *Mx.*
C. Chenopodii *Fckl.*	"	Chenopodium album. *L.*
Peronospora pygmæa *Ung.*	"	Anemone nemorosa *L.* Hepatica triloba *Chaix.*
P. infestans *De By.*	"	Solanum tuberosum *L.*
P. alta *Fckl.*	"	Plantago major *L.*
P. effusa *Grev.*	"	Œnothera biennis *L.*
Erysiphe Liriodendri *Schw.*	"	Liriodendron Tulipifera *L.*
Sphærotheca Castagnei *Lev.*	"	Geranium maculatum *L.*
Epichloe typhina *Berk.*	"	Glyceria nervata *Trin.*
Sphæria Collinsii *Schw.*	"	Spiræa salicifolia *L.*
Sphærella Impatientis *P. & C.*	"	Impatiens fulva *Nutt.*

In closing this report, grateful acknowledgments are rendered to those botanists whose names already appear in the preceding pages for their kind coöperation in the investigation of our flora, and for their generous contributions of specimens.

When no name is added to the station or stations herein given the plant has been found therein by the writer. Dates signify the time when the specimens were collected.

Respectfully submitted.

CHAS. H. PECK.

ALBANY, *January* 6, 1877.

NOTES UPON THE LITHOLOGY OF THE ADIRONDACKS.

By ALBERT R. LEEDS.

It is not the object of the present paper to present a complete lithology of the Adirondacks. This is not possible, during the present very partial state of our knowledge concerning the rocks of this region. A large portion of it still deserves its popular name of "The Wilderness," and the surface rocks of this vast area have not even been carefully collected, while a beginning only has been made in the critical study of those which have. The geological map of this district covers with a uniform expanse of color, and aggregates together under one common name, rocks of many varieties, occurring under many different relationships to one another, and of whose past history and transformations, probably far more diversified and complex than we have hitherto imagined, we know but very little and that imperfectly. It will be a labor of some years, upon the sound basis of an exhaustive topographical survey, to lay down the stratigraphy of this region, to analyze chemically and optically its various rock-formations and assign them their relative place and importance as chapters in the primeval geological history. We shall attempt therefore nothing more than to give: 1st. An outline of what has been done hitherto in this field. 2d. A description of the rocks so far collected by the writer, and whose physical and pyrognostic characters have to a certain extent been determined. 3d. The analyses of some of the most important typical rocks and minerals. 4th. Results of the microscopic study of their rock-sections. 5th. Inferences drawn from the limited range of studies detailed above.

I. Previous Literature.

The principal portion of our previously-acquired knowledge is contained in the Report upon the Geology of the Second District of New York, published by Prof. E. Emmons in the year 1842. He devotes more especial attention to this subject, because, as he states, the hypersthene rock and its varieties, had not been regarded as an American rock, until after the survey of New York was in progress. In using the term Hypersthene Rock, he follows MacCulloch, who had previously applied this name, he says, to the same mass in Scotland. His classification of the varieties of hypersthene rock is as follows:

1. The most common of the varieties is composed wholly of labradorite, though to the eye it appears like a mixed or compound mass, as it has the aspect of being made up of two distinct minerals.

2. Labradorite and hornblende. The hornblende appears usually to take the place of the hypersthene, though not always; for sometimes the latter is still present.

3. Labradorite, hornblende and epidote; the latter, however, never is in sufficient quantity to give character to the rock.

4. Granular labradorite and mica, a variety which is quite dark, and has much the aspect of trap.

In this classification the variety composed of labradorite and hypersthene, from which the whole formation derives its name, has been accidentally omitted.

To this should be added as distinguishing characteristics:

5. That magnetic oxide is also disseminated very frequently through the mass, making it eminently an iron-bearing rock; also garnet in grains, or small masses, scarcely ever in crystals; it is common near the junction of the rock with the ore beds.

The rock has a jointed structure; in addition to which, it is often traversed by segregated veins and cracks or false joints; the latter serving to divide the mass into wedge-form pieces, are finally detached, and form the talus at the base of the cliffs.

The predominant color of the rock is smoke-grey, light or dark, weathering to ash-grey. The color most constantly associated with this is a dingy-green, which belongs, according to Emmons, to the labradorite, and not to the other minerals which happen to be present. It is traversed by a double system of joints, or divisional seams, which run S. 5° W. and N. 85° E., with a variation in this direction, amounting to from 5° to 10°, when observed at different places. Quartz is seldom found in this rock, occurring only in seams or thin irregular veins. The associated rocks are those allied to trap, of which the most constant in its occurrence is a compound of hornblende and feldspar, forming a granular mass quite friable in its texture, and of a dirty grey color. It is generally found in layers in the veins of iron ore, or in the vicinity of ore beds; it often forms, also, dykes traversing the rock in the manner of the common green-stone trap, as may be seen on Mt. McMartin, by Avalanche Lake. The hypersthene rock also contains two varieties of porphyry: 1. With a base of light green compact feldspar, spotted with small masses of a deep bluish-green feldspar. 2. With a white or flesh-red compact base, in which there are angular masses of greenish compact feldspar. Connected with these porphyries is prehnite, in mammillary masses of a pale green color, with a few indistinct crystals.

"The porphyries or breccias, which have been found mostly in loose masses upon the beaches of the East river, are undoubtedly all of them in veins like the ordinary trap of this region. One locality is known on this river, which it crosses one or one mile and a half below the Great Falls. It is an extremely tough mass, being composed of chalcedony and feldspar, and a decomposable green substance. Rolled masses of the common flesh-colored feldspar or granite, and handsome specimens of graphic granite, are also found. A variety of feldspar is not unfrequent in veins in the hypersthene, which resembles albite; and it seems to take the place of this mineral, or to hold the same relation to the hypersthene rock that the common albite does to the coarse granites of New England. It is in laminated and stellar masses, like the albite of Chesterfield, but not so distinct, or handsome. There is also a labradorite, of a dark bottle-green color, in cleavage masses, two or three inches in length, with striated surfaces and more feeble opalescence than the blue variety. This rock, above Russell Falls on the Ausable, passes into a light green and nearly compact feldspar. When wet, it is a pale apple-green; but when dry, it is dull, and weathers rapidly into a putty-like clay."

It will be seen from the above rather full abstract, that valuable as were the observations of Emmons, but little was done, or was possible at that time, towards forming a systematic lithology of the Adirondacks.

That lithology has its foundation in the extensive researches of Sir Wm. Logan, Prof. T. Sterry Hunt and their colleagues upon the azoic formation of Canada, and many valuable contributions towards it are embodied in the Canadian Geological Reports. Prior to their researches, the rocks underlying the fossiliferous strata had not been subdivided into well-characterized groups with distinctive local names. The first broadly defined group of rocks which were so divided off, were those which are largely developed in the rock-masses of the Laurentian Mts., and which were accordingly named by the Canadian Survey in 1846, the Laurentian System. Then, and in subsequent publications of the Survey, this name was applied to a vast thickness of highly altered metamorphic strata, consisting of feldspathic rocks interstratified with limestones and quartzites. The feldspathides included both the gneisses, which contained orthoclase and other rocks, more or less gneissoid in structure, but composed mainly of some variety of triclinic feldspar. The latter were further distinguished by a comparative absence of quartz, and the association with hypersthene, pyroxene or similar constituent. At that time they were not put in a separate group, but were merely classed together under the general term, anorthosites.

The orthoclase gneisses of the Laurentian system are characterized by their color, which, owing to the potash-feldspar, is generally reddish, though sometimes white to bluish-grey, by the presence of quartz, and by the frequent occurrence of hornblende and mica. They are both fine- and coarse-grained, in the latter case sometimes to such an extent as to present the appearance of a granitoid gneiss. The accompanying minerals are so disposed about the large cleavable masses of feldspar as to give a more or less reticulated appearance to the rock. But, in both coarse and fine, the metamorphic character of these gneisses, is manifested in the never-failing parallelism of the layers, in which the constituent minerals are arranged. These two varieties of orthoclase-gneiss, of which the granitoid constitutes the main peaks and ridges of the orthoclase region and is sometimes several thousand feet in thickness, are interstratified with bands of limestone and associated with quartzite and beds of hornblende and micaceous schist. Masses of pyroxenite are met with near the limestones, and the schists are frequently highly garnetiferous. The garnets are sometimes disseminated through a pure white orthoclase, or, associated with quartz, characterize many varieties of garnetiferous gneisses and quartzites. The limestones are both calcites and dolomites, the latter interstratified with the former, or more or less mechanically mingled with them. They also occur separately, as rock-masses of great extent. Serpentine, hornblende, tremolite, mica and graphite, are imbedded in these rocks, frequently in bands plainly or obscurely parallel with the beds ; also pyroxene, wollastonite, apatite, chondrodite, quartz, scapolite, pyrite, and more rarely, zircon, spinel, fluor spar, idocrase, tourmaline, corundum and chalcopyrite.*

At the time of the publication of the Canadian Geol. Report of 1863, the identity of the Laurentian gneisses with the "Fundamental Gneiss" of the Western Isles of Scotland, had been recognized by Sir Roderick Murchison, and the term Laurentian correspondingly extended.† Emmons had previously given the name of Hypersthene Rock, rather than that of Labradorite Rock, which latter he appears to have preferred, to the mixtures of labradorite and hypersthene, occurring in the Adirondacks, for two reasons ; 1st, on the ground of identity of these rocks with those occurring in Scotland, and 2ndly, the priority of MacCulloch's name of hypersthene rock as applied to them in the isle of Skye and elsewhere.‡ In the Canada Report above quoted, these hypersthene rocks, were referred under the appellation of anorthosites, to the Laurentian system. The rocks of the Adirondack Mts., were stratigraphically connected with the main body of the Laurentian range, through the exposure of azoic rocks, which crosses the St. Lawrence at the outlet of Lake Ontario. Subsequently, these anorthosites were shown by Sir Wm. Logan to be unconformable with the orthoclase-gneisses, limestones and quartzites, with which in certain portions of Canada they were interstratified, and were separated from them under the name of Upper Laurentian. This term was preferable to the "Labradorian System," a name which Sir Wm. Logan also used, on account of the extensive development of these anorthosites in Labrador, and the predominance of labradorite among their feldspathic constituents.

In one of the most recent of his very valuable contributions to American lithology, Dr. T. Sterry Hunt has urged the adoption of the title of Norian, instead of Labradorian or Upper

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* Geolog. Report of Canada, 1863, p. 24–31. † Geol. of Canada, 1863, pp. 22.

‡ Geol. 2nd. District New York, pp. 27, 28.

Laurentian system,* on the ground of the identity of these anorthosites, with a vast extent of similar rocks found in Norway, and to which the name of Norite has long since been applied by Esmark.

The great value of this creation of the title "Norian System" is two-fold: — 1st. In distinguishing a widely-spread and strongly-characterized subdivision of the eozoic rocks, by a name applicable to their most important constituent rock, and by a local name moreover, which had been previously applied to these rocks, from a locality where they had been carefully studied. 2nd. In fixing the precise meaning of the term Norite, and establishing thereby an exact nomenclature for certain rocks, which had been very differently classified by preceding authors.

The name of Norite was originally applied by Esmark to certain Norwegian rocks, which are composed principally of a feldspar and hornblende, and which he regarded as a variety of diorite. They resembled diorite, moreover, in containing quartz and mica. With these diorite-norites, he also included some varieties of gabbro.† In this he was followed by Scheerer, who called the gabbro of the islands of Anabelöe and Hitteröe, norite. It is a mixture of diallage or hypersthene, labradorite, soda-orthoclase, and usually some quartz. Both these latter minerals are so infrequent in mixtures of hypersthene and labradorite, that such a gabbre would have to be regarded as an unusual mineral combination. According to Kjerulf,‡ the composition of I, a violet norite, consisting of labradorite and green diallage, from Tronfjeld, and II, a yellowish-grey norite, composed of labradorite, black augite, some tombac-brown mica and menaccanite, from Sölvsberg, is as follows:

	I	II
Silica	50.06	51.47
Alumina	16.44	15.62
Ferric Oxide	7.71	12.17
Lime	14.66	11.69
Magnesia	4.88	4.10
Potash	Tr.	0.20
Soda	1.38	0.55

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* Amer. Jour. Sci., 1870 ([2] xlix, p. 180.)

† Zirkel, Lehr. der Petrographie, Vol. ii, p. 15.

‡ Kjerulf, N. Jahrb. f. Min. 1863 — quoted by Zirkel, ib. p. 131.

	I	II
Titanic Acid	5.73	0.75
Ignition	.....	1.22
	100.86	97.77

The gabbro-norite of Scheerer is characterized by the predominance of its feldspathic constituent, which is aggregated into concretionary masses, the augite being very subordinate. This description recalls the structure of the orbicular-diorite, or napoleonite, of Corsica, which consists of concretions of anorthite and hornblende, together with some quartz. In a general inspection of the suite of Adirondack rocks, whose particular description is to be given later, the most striking peculiarity of their structure is a similar aggregation of the feldspar, and sometimes though more rarely of the hypersthenic element, into masses which have a stratified appearance, arising from the parallel arrangement of the constituent minerals. Moreover, the Canadian norites, according to Dr. Hunt, are undoubtedly a bedded rock, and also the mixtures of labradorite, pyroxene and menaccanite, described by Haughton as occurring at Loch Scavig,* and whose similarity in lithological characters to the Canadian norites, had previously been noted.† The identity of these rocks with those of Norway, was further established by Dr. Hunt in a personal examination of the rocks, sent by the Royal University of Christiania to the Universal Exhibition at Paris, as a part of its geological display, and exhibited under the name of norites. In a printed note accompanying this collection from the University, it is said that the numerous varieties of rocks consisting of labradorite with hypersthene, diallage and bronzite, have, in the geological map of Southern Norway, published at Christiania in 1866, been designated by the common name of gabbro. This note at the same time suggests that "the name of norite should be preserved for certain varieties of gabbro rich in labradorite, which varieties may in great part with justice be called labradorite rock, since labrador feldspar is their predominant element." If along with labradorite, the other related triclinic feldspars from anorthite to andesine be included, the term norite becomes generically descriptive of the anorthosite rocks composing the Norian System in Canada, northern New York, and elsewhere. It will be so employed in the subsequent portions of this article, the names hypersthenic-hornblendic, or pyroxenic-norite, being applied to rocks in which these secondary ingredients occur, rather than hyperite, diorite or dolerite into which such rock combinations may pass, but from which they are to be distinguished by the stratified and concretionary structure of the constituent minerals.

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* Dublin Quarterly Journal, 1865, Haughton.

† Ib., July, 1863, T. S. Hunt, quoted in Amer. Jour. Sci., 1870, loc. cit.

II. DESCRIPTIVE LITHOLOGY.

The rocks, 69 in number, were all collected in the county of Essex, and most in the valley and township of Keene. Very many others, presenting nothing in their characters distinctive from the 69 mentioned, were excluded from this description. The design was not to attempt the study of the stratigraphy of the Adirondacks at the present time. It was rather, as preliminary to such an undertaking, to analyze and classify with precision as many varieties of Adirondack rock-masses as possible, in order to compare the rocks of one and different localities, and, in case of erratic boulders, to ascertain their origin and mode of distribution. During the course of last summer, the specific gravities of 44 of these specimens were determined by Mr. Brown Ayres, one of the students of the Stevens Institute of Technology, who was also my field-assistant. It will be most convenient, to study these varieties in the ascending order of their specific gravities, as they are presented in the following table:

Table of Specific Gravities of Norites.

1	2.67	16	2.81	31	3.09
2	2.68	17	2.82	32	3.097
3	2.69	18	2.82	33	3.097
4	2.70	19	2.86	34	3.10
5	2.71*	20	2.89	35	3.11
6	2.71	21	2.89*	36	3.11
7	2.71	22	2.89	37	3.13
8	2.72	23	2.91	38	3.15
9	2.74	24	2.96	39	3.17
10	2.74	25	2.96	40	3.21
11	2.76	26	2.97	41	3.23
12	2.77	27	2.99	42	3.24
13	2.77	28	3.00	43	3.386 †
14	2.77	29	3.04	44	3.459 ‡
15	2.79	30	3.062		

* Analyzed. † Diallage. ‡ Hypersthene.

These gravities were determined upon masses weighing from 5 to 15 grammes, and are all reduced to 0°C. They vary from 2.67, a figure agreeing with the lowest limit of the numbers, which have been obtained in determinations of the specific gravities of any labradorites, to 3.459, the specific gravity of diallage. These figures may be taken as the extremes, within which the specific gravities of norian rocks, composed of mixtures of labradorite and pyroxene in all proportions whatsoever, will vary. A lower specific gravity will be attributable to some other variety of feldspar, or an admixture of quartz: a higher, to an unusual percentage of garnet, menaccanite or magnetite. As an instance of the former, a specimen (a), analyzed in Part III, and microscopically examined in Part IV, may be mentioned, which strikingly differs in its characters from any of those contained in the above table. It resembles, in appearance, a vitreous ferruginous quartzite of a dark red color, for which at first sight it was mistaken. It is readily distinguished, however, by the finely striated surfaces of the minute crystalline masses, of which it is composed. The specific gravity of the powdered rock, such as was used in its chemical analysis, is 2.635, while that of the original mass is 2.65. The difference is due to the crystals of magnetite and menaccanite, picked out by the magnet prior to analysis, many being large enough to be visible to the naked eye. It fused more difficultly than labradorite, with the formation of a clear white glass, the red color disappearing, and the metallic constituent rendering the remaining partially fused portion black. It gives a strong flame-reaction, indicative of the presence of sodium. In these respects it resembles oligoclase, which is sometimes reddish, has a fusibility of 3.5, a specific gravity of 2.56–2.72, and contains much more soda than lime.

Nos. 1, 4, 8 and 39 are similar to one another in composition, and somewhat, though less so, in appearance. They consist of labradorite chiefly, and hornblende, disposed in parallel masses, the latter mineral increasing with the specific gravity. The gravity of No. 1 is 2.67, while that of labradorite itself varies between 2.67 and 2.76. This extremely low result is due to the mineral having lost some of its earthy bases by weathering, a change also shown by the iron stains on a fresh fracture of the decomposing rock, and by the white flinty exterior, from which the labradorite has disappeared leaving angular fragments of quartz projecting ; 42 is similar to the three preceding, but owes its exceptionally high gravity to many included iron-lime garnets, which, in conjunction with hornblende and weathered labradorite, account for its dark reddish-yellow appearance.

The above, on account of the strikingly stratified arrangement of their constituents, might be termed Gneissoid Norites. Along with them, should be included specimens 9, 14, 15, 16, 17, 20, 24, 29, 31, 37, 57 and 63. The labradorite of Nos. 9, 14 and 15, is almost as white as milky quartz — an appearance due to partial alteration, and the segregation of minute amorphous particles parallel to the stratification. These impart a milky aspect to the mass, and obscure the limpidity of thin sections. No. 14 also includes large masses closely striated, but of a white vitreo-waxy appearance, in this respect differing from the more highly vitreous smoky-grey crystalline aggregates, presently to be described. The interstratified black portions are, in part, diallage. Their metallic, in some specimens, even bronze-like lustre, has caused the names hypersthene and bronzite to be applied to them. They are associated with hornblende, derived from alteration of the diallage. The alteration in some cases is nearly complete. Besides diallage and hornblende, specimens 16, 17, 24 and 31, include almandite and 20 essonite, mostly distributed through the feldspathic base.

Nos. 2, 3, 5, 6, 7, 10, 11, 19, 25, 28, 31, 59, 60, 62 and 65, may be grouped together and classified under the title of Porphyritic Norites, inasmuch as they consist of highly twinned and finely striated polysynthetic macles of labradorite, in a coarse or finely-granular crypto-crystalline labradorite paste. Although this matrix in external aspect, differs so widely from the included labradorite crystals, that it is often mistaken by mineralogists for some other species, yet, as will be seen in Part III of the present article, in specific gravity, composition, pyrognostic and physical characters, it is almost identical. In some varieties, no other mineral is present in separately visible masses, and this species of norites, passes into Porphyritic Labradorite. The crypto-crystalline paste, as in No. 5, the specimen whose complete analysis is given beyond (A), is sometimes in color and lustre not unlike common yellow wax, thus contrasting strongly with the more vitreous bluish-smoky crystals imbedded in it. Or the paste may be granular or compact, or dirty-white or light or dark-green in color. Sometimes, when diallage is present, it may be segregated into minute separate masses, or distributed through the paste, may communicate to it a color.

In specimen 2, almandite, in Nos. 19, 25 and 31, diallage and hornblende as well, are present in these porphyritic norites, the garnets being in these cases more especially associated with the non-feldspathic portion. Garnet is not unfrequently disposed as a red border around the greenish masses of diallage, along the bounding surfaces between it and the labradorite. The included crystals are sometimes magnificently opalescent, as in No. 65 (a specimen not tabulated), which was obtained from a large boulder, probably derived from the adjacent mountain, lying in the Uba trail. When opalescence is not evident upon a natural or fresh fracture, it may be developed by grinding and polishing. This is beautifully shown in a large mass, weighing about 20 pounds, brought from the summit of Mt. Marcy, and polished, by kindness of Mr. John Matthews, at his manufactory in New York. It is of a mottled smoky-grey color, opalescent in the more highly crystalline portions. Unfortunately, the pyroxenic ingredient wears away irregularly and does not admit of polishing, while the feldspar is opalescent only where the incident light falls at particular angles — properties which must seriously militate against the introduction of any, but the most homogeneous of these porphyritic norites, as an ornamental stone.

In Nos. 30, 32, 33, 34, 35, 36 (see its microscopic characters, Part IV) and 41, the labradorite is represented by a very dark green variety. It appears to have undergone great alteration, having lost its crystalline character and become translucent, acquiring at the same time a greenish color. It is intermixed with much finely-granular quartz, visible only under the microscope. With these, reddish-brown hornblende is associated, having been derived from an alteration of the diallage so extensive, that the latter mineral is represented only by some scattered green particles, invisible to the naked eye. In specimen 63, the pyroxene is not foliated or bladed, but is the green granular variety called coccolite. It was obtained on the road from Lake Placid to Wilmington.

There are several varieties of labradorite rock, occurring in the Norian System of the Adirondacks, which are not porphyritic, as in specimen 33, which is apparently massive though in reality crypto-crystalline. On a fresh surface of fracture it is green, no diallage in separate masses being visible, but on a weathered surface it is white with green spots, showing that in fact the constituent minerals are partially segregated. A very common variety in certain localities, as on the East Branch of the Ausable River, where it forms hemlock-covered cliffs, is a greasy green compact labradorite, with some admixed diallage and garnet. In some of the norian porphyries, the smoky-grey crystalline portion predominates to the almost entire exclusion of the feldspathic matrix. There are also Pyroxenites, with but little feldspar admixed, and in which the pyroxene is sometimes the broadly foliated deep green variety of diallage, and at others is faintly or strikingly metallic in appearance.

In a few localities, rocks composed mostly of iron-garnet with some hornblende, have been encountered, showing a passage, by diminution of the feldspathide, of norite into grenatite.

Besides these norites proper, there are many intrusive masses composed of similar materials, but in which the constituents are not stratified, and are too finely divided to be visible to the naked eye. They consist chiefly of labradorite, quartz, pyroxene and to some extent hornblende, magnetite and menaccanite. Their specific gravity is about 2.9, in which respect they stand midway between the extremes of the Norian series. They have a dark grey or black color, with a smooth and sometimes large conchoidal fracture, and in some localities, as in specimen 66, obtained from the summit of Mt. Marcy, weather unequally into a pitted surface stained by yellow oxide of iron.

The pyroxenic constituent in these norites contains so large a percentage of iron, that fusion takes place very readily (F=3 to. 3) with a production of a black globule, generally very magnetic. In some cases, it is itself magnetic, from included magnetite.

III. ANALYSES OF THE MOST IMPORTANT MINERALS AND ROCKS.

The first point to be definitely established, was the constitution of the feldspars, which occur in this suite of Adirondack norites. Their specific gravities, degrees of fusibility, and flame-reactions, together with their optical characters, readily permitted their reference to that group of feldspars, which on account of its crystallographic relationships, has been termed Plagioclase, and with a single exception to that species of plagioclase, known as Labradorite. But to determine the formulæ of these particular labradorites, together with any important variations in their constitution, if such variations exist, as numerous quantitative analyses as time would permit, were requisite. With this object in view, the two varieties of Norian labradorite, which were found to be most widely divergent in physical characters, were selected. The one, was that which occurs in crystalline masses, with faces sometimes several inches in breadth and length. The faces are finely ruled with lines, significant of the multitude of individuals composing these polysynthetic aggregates. This variety is usually dark-grey or smoky, sometimes approaching to bluish in tint, and frequently opalescent. Such is the case with the material picked out for analysis, from the norite forming the mass and summit of Mount Marcy, the highest peak into which the Norian System of Northern New York rises, its altitude being 5,400 feet. The results are given under A.

The other variety is less vitreous in lustre, approaching often to waxy. This aspect especially characterizes the specimen analyzed, which also resembles common wax in color. It is crypto-crystalline, forming the matrix, however, of smoke-colored crystals analogous to the above. Its microscopic characters will be found in Part IV. The plagioclase base, forming similar porphyries and probably not differing essentially in composition from this type specimen, is also white to grey, and light- to dark-green in color, varying from compact (in reality crypto-crystalline) to fine- and coarse-granular, and even minutely phanero-crystalline in structure. In the latter case, the imbedded crystalline masses, are only distinguished by their greater size, their darker color and different lustre, from the feldspathic matrix. The composition of this variety is given under B.

	A.	B.
Specific Gravity	2.72	2.70
Silica	54.47	54.62
Titanic Acid	undet.	undet.
Alumina	26.45	26.50
Ferric Oxide	1.297	0.757
Ferrous Oxide	0.665	0.565
Lime	10.80	9.88
Magnesia	0.69	0.74
Potassa	0.92	1.23
Soda	4.37	4.50
Water	0.53	0.91
	100.192	99.702

Computation of Analysis A.

	Radicals.	Atoms.	Quantivalents.		Ratio.
Silicon	25.42	0.9079	3.6316	3.6316	6.83
Aluminum (Al)	14.07	0.2577	1.5462	1.5948	3
Ferricum (Fe)	0.9079	0.0081	0.0486		
Ferrosum	0.5172	0.0092	0.0184	0.5991	1.13
Calcium	7.714	0.1928	0.3856		
Magnesium	0.415	0.0173	0.0346		
Potassium	0.764	0.0195	0.0195		
Sodium	3.242	0.1410	0.1410		

The quotients obtained by dividing the percentages of the radicals by their atomic weights, are here employed to express the relative number of atoms of these radicals present in the compound, and the relation existing between these numbers is called the Atomic Ratio. The products formed by multiplying the atoms by the quantivalences, which they possess in the particular combination under consideration, have been termed above Quantivalents. Similarly, the ratio between these products might be called the Quantivalent Ratio. The latter has in some places been called the Atomic Ratio, but this term may with greater propriety be restricted to the first. The products themselves, for distinction's sake, are styled Quantivalents. This term is open to objection, on account of the close similarity of sound between Quantivalents and Quantivalence. For this reason, following the analogy of the substitution of the shorter terms, monad, dyad, triad, etc., for their synonyms, univalent, divalent and trivalent radical, Quantivalents might be abbreviated into Quantads. They have elsewhere been styled Chemical Units.

It will be seen that the Quantivalent Ratio $R^{II}_2 : R^{VI} : Si^{IV}$ is 1.13 : 3 : 6.83, and the comparison with the quantivalent ratios of related minerals will be made in its proper place farther on. The Atomic Ratios are as follows :

Na (K) : Ca (Mg, Fe) = .1605 : .2193 = 1 : 1.4
Na : Ca = .1410 : .1928 = 1 : 1.4
Al (Fe) : Si = .2658 : .9079 = 1 : 3.4
Al : Si = .2577 : .9079 = 1 : 3.5

Then on the supposition that labradorites are mixtures of Anorthite and Albite in various, but definite relative proportions, a hypothesis presently to be discussed, the constitution of this variety might be expressed by

$$3\ \text{Mol. Anorthite} + 1\ \text{Mol. Albite, or}\ \left.\begin{array}{l} 3\ Ca\ \ Al\ Si^2\ 0^8 \\ \qquad Na^2\ Al\ Si^6\ 0^{16} \end{array}\right\}$$

Computation of Analysis B.

	Radicals.	Atoms.	Quantivalents.		Ratio.
Silicon	25.49	0.9104	3.6416	3.6416	6.92
Aluminum (Al)	14.10	0.2583	1.5498	1.5786	3
Ferricum (Fe).	0.4394	0.0048	0.0288		
Ferrosum	0.5299	0.0078	0.0156	0.5766	1.09
Calcium	7.057	0.1764	0.3528		
Magnesium ...	0.444	0.0185	0.0370		
Potassium	1.02	0.0261	0.0261		
Sodium	3.339	0.1451	0.1451		

The quantivalent ratio for $R^{II}_2 : R^{VI} : Si^{IV}$ is 1.09 : 3 : 6.92, which differs so slightly from that of A, that if, as is customary, the ratios had been carried out only to the first place of decimals, they would have been identical in the two varieties of labradorite. The atomic ratios are :—

Na (K) : Ca (Mg, Fe) = .1712 : .2027 = 1 : 1.12
Na : Ca = .1451 : .1764 = 1 : 1.22
Al (Fe) : Si = .2631 : .9104 = 1 : 3.46
Al : Si = .2583 : .9104 = 1 : 3.52

They are expressed, on the supposition stated above, in the formula,

$$\left.\begin{array}{l}2\,\mathrm{Ca}\ \mathrm{Al}\ \mathrm{Si}^{2}\,0^{8}\\ \mathrm{Na}^{2}\,\mathrm{Al}\ \mathrm{Si}^{6}\,0^{16}\end{array}\right\}\quad \text{or, }\left.\begin{array}{l}\text{2 Mol. Anorthite}\\ \text{1 Mol. Albite}\end{array}\right\}$$

In A, if Na : Ca = 1 : 1.5, then Al : Si = 1 : 3, instead of 1 : 3.5, as obtained by the analysis; and in B, if Na : Ca = 1 : 1, then Al : Si = 1 : 1.33, instead of 1 : 1.52.

Much of the ferric, and probably all of the ferrous, oxide, exists in both these varieties of labradorite as magnetite and menaccanite, and if we knew with exactness the composition of the latter mineral as it exists in the minerals, might with advantage be excluded from the computation of the formulæ. The silica in both analyses exceeds that which the formulæ require, but this excess, as the microscopic examination shows, is not due to combined silica, but to free quartz. And it is important to note, that while quartzites are not included in this suite of Adirondacks rocks and were not encountered by the writer in the limited area from which the collections were made, at the same time, in every microscopic section examined and every analysis which has been performed, a notable amount of uncombined silicic acid is present. In some cases, it is true, veins filled with quartz and amethyst crystals have been encountered, but these appear to have been formed by infiltration and deposition.

If the density of Albite be 2.62, its atomic volume is 400.4. Moreover, assuming that homœmorphous species have similar atomic volumes, the formula of anorthite will be $\mathrm{Ca}^{2}\,\mathrm{Al}^{2}\,\mathrm{Si}^{4}\,\mathrm{O}^{16}$, and its atomic volume, with density 2.76, is 403.8. The relationship between the two varieties of labradorite would then be :—

		Density.	Atomic Vol.
A	$\frac{3}{2}\ \mathrm{Ca}^{2}\ \mathrm{Al}^{2}\ \mathrm{Si}^{4}\ 0^{16}$ $\mathrm{Na}^{2}\ \mathrm{Al}\ \mathrm{Si}^{6}\ 0^{16}$	2.72	400.2
B	$\mathrm{Ca}^{2}\ \mathrm{Al}^{2}\ \mathrm{Si}^{4}\ 0^{16}$ $\mathrm{Na}^{2}\ \mathrm{Al}\ \mathrm{Si}^{6}\ 0^{16}$	2.70	400.6

In these two closely related minerals, the densities as determined by careful trial, vary directly with the atomic weights and the atomic volumes are nearly equal. Upon the supposition that the atomic volumes of homœmorphous species are identical, and that, as appears to be the case with the two labradorites and the albite, the atomic volume for the group of plagioclase feldspars is 400, how closely do the observed agree with the theoretical densities in other recorded analyses of labradorite? We shall use in this comparison:—I, Labradorite, from Neurode, Silesia, occurring in Hyperite. v. Rath. II, From Neurode (Volpelsdorf). v. Rath. III, Näröedal, Norway. Rammelsberg. IV, Berufjord, Iceland. Damour. V. Egersund, Norway. Kersten. VI, Havnefjord, Iceland. v. Rath. VII. Lund, Sweden. In Dolerite. Blomstrand. VIII, St. Paul's Island, Labrador. Tschermak.*

	Atomic Ratio.	Formula.	Density.	
	Na : Ca		Theoretical.	Observed.
I.	1 : 3½	3½ An. + 1 Al.	2.7498	2.715
II.	1 : 3	3 An. + 1 Al.	2.745	2.709
III.	1 : 2½	2½ An. + 1 Al.	2.739	2.714
IV.	1 : 2	2 An. + 1 Al.	2.731	2.709
V, VI.	1 : 1½	1½ An. + 1 Al.	2.7208	2.705 and 2.729
VII, VIII.	1 : 1	1 An. + 1 Al.	2.704	2.68 and 2.697

If, instead of assuming that the atomic volumes are identical, we take for the at. vol. of Anorthite, that deduced from its mean specific gravity, or 404, and furthermore assume that the molecules of the constituent minerals occupy in the labradorite their normal volumes, we have the following relations:

	Formula.	Density.	
		Theoretical.	Observed.
I.	3½ An. + 1 Al.	2.728	2.715
II.	3 An. + 1 Al.	2.724	2.709
III.	2½ An. + 1 Al.	2.720	2.714
IV.	2 An. + 1 Al.	2.713	2.709
V, VI.	1½ An. + 1 Al.	2.704	2.705 and 2.729
VII, VIII.	1 An. + 1 Al.	2.691	2.68 and 2.697

The lack of closer agreement between the theoretical and observed density may be due to lack of structural homogeneity or continuity, and not to real discrepancies.

The above theoretical interpretation of the results of these labradorite analyses, is founded upon a certain misconception of views which were originally advanced by Dr. T. Sterry Hunt so long since as September, 1853, in an article published in the American Journal of Science of that date, upon "The Constitution and Equivalent Volume of Mineral Species." They were further expanded in an essay entitled Illustrations of Chemical Homology, which was published in the Proceedings of the American Association for the Advancement of Science, for 1854, and explicitly set forth in an abstract of the same, published in the American Journal of Science for September, 1854. A summary of these views, in the language of the original memoirs, together with some further illustrations taken from a later paper by the author in the Compte Rendu of the French Academy of Sciences for June 29, 1863, is given in the Seventeenth of the Chemical and Geological Essays, collected by Prof. Hunt into book-form and re-published in 1875. "It was asserted that the simple relations of volumes which Gay Lussac pointed out in the chemical changes of gases apply to all liquid and solid species, thus leading the way to a correct understanding of the equivalent volumes of the latter. While chemists have not hesitated to assign high equivalents to bodies of the carbon series, they have been inclined to make the equivalent weights of denser mineral species correspond to formulas representing the simplest possible ratios. We endeavored, from a consideration of the theory of equivalent volumes, to point out the errors to which this method has led, and to show that we must assign to most mineral species much higher equivalent weights than have hitherto been admitted."

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* Quoted from Handb. der Mineralchemie, Rammelsberg, Vol. II, p. 562.

"It was further asserted that a relation similar to that observed in the formulas of allied hydrocarbonaceous bodies, and designated as chemical homology, exists in the formulas of mineral species. It was shown, from the relations of carbon, sulphur, and oxygen on the one hand, and of hydrogen and the metals on the other, that M_2S_2, M_2O_2, and H_2O_2 (M representing any metal) may be compared with H_2C_2. This view will be applied in extending the application of the principle of homology."

"We have further asserted that, for species crystallizing in the same form, the density varies directly as the equivalent weight, so that the quantities obtained in dividing the one by the other, and known as the atomic or equivalent volumes will be equal. Such a relation is already recognized between species of the same genus, and we now propose, having fixed an equivalent weight for one species, to calculate, from their densities, those of the species isomorphous with it, and to show from their densities, those of the species isomorphous with it, and to show from the formulas corresponding to these equivalent weights that the different genera thus related are homologous, or exhibit other intimate relations.

"An attempt was then made to fix the volume of the prismatic and rhombohedral carbon-spars, which were compared respectively with the isomorphous species bournonite and the red silver ores, proustite and pyrargyrite. The received formula of bournonite being doubled, and that of the rhombohedral sulphides made to correspond with it, we find for the prismatic species an equivalent volume of 508, and for the rhombohedral ones 546–564. In accordance with this the equivalent of calcite corresponds to $C_{30} Ca_{30} O_{90}$ (C=6 and 0=8), while dolomite, chalybite, and diallogite become $C_{36} M_{36} O_{108}$, and calamine and magnesite $C_{40} M_{40} O_{120}$. For the prismatic carbonates, aragonite, like calcite, is $C_{30} M_{30} O_{90}$, while strontianite, cerusite and bromlite are $C_{25} M_{25} O_{75}$, and witherite is $C_{22} M_{22} O_{66}$."

"From Glauber-salt and borax were deduced, in like manner, an equivalent volume of about 440, corresponding nearly with that of saccharose with $C_{48}=430$, and with these were compared the silicates of the amphibole group, from which it was concluded that these silicates present among themselves relations similar to those of the homœomorphous carbon-spars. The attempts to deduce correct formulas for these and other silicates at that time, were, however, vitiated by many incorrect analyses, and rendered uncertain by doubts as to the equivalent weight of silicon."

"An important point in the question of homology and homœomorphism was then referred to in the following language :—The similarity in crystallization between species whose formulas differ only in the elements of water has been pointed out by Laurent in certain salts of organic acids, and is seen in several mineral species. The chabazites, for example, give the formula 3 Ro. $Si O_3$, 3 $Al_2 O_3$, 2 $Si O_3$, with 15 HO and 18 HO, while the variety lederite affords, according to Hayes and to Rammelsberg, but 6 HO. The hydrous iolites are also cases in point, as well as aspasiolite, the serpentines, and the talcs, with their varying proportions of water. In the formulas of these species, water appears to replace magnesia, and Scheerer has shown that many different species may be referred to a common chemical type, by admitting 3 HO to replace Mg O, and 2 HO to replace Cu O, etc. These cases, to which he has given the name of polymeric isomorphism, are but instances of the partial substitution of water for other bases in homologous genera which differ by n MO."

"In the continuation of this subject, in 1854, as above referred to, the question of homologies was further illustrated by the neutral and basic nitrates of lead, represented by a common formula $(Pb_2 O_2)$ n. $N_2 O_{10}$. These salts vary in solubility and in physical characters, but resemble each other in yielding nitric acid and oxide of lead as results of their decomposition, and are completely analogous to the homologous series of Gerhardt, which differ by n $(C_2 H_2)$. From the relation between basic and hydrated salts, the same view is to be extended to the latter, and species differing by n $(O_2 H_2)$ and n $(O_2 M_2)$ may thus be homologous. The above formulas are intended to involve no hypothesis as to the arrangement of the elements, for in the author's view, each species is an individual, in which the pre-existence of different species that may be obtained by its decomposition cannot be asserted. He regards silicates like eudialyte, sodalite, and pyrosmalite as oxychlorides, $(M_2 O_2)$ n. Mcl, and nosean, hauyene, and lapis-lazuli as basic sulphates $(M_2 O_2)$ n. $S_2 O_8$, while cancrinite, and perhaps some scapolites, are (may perhaps be) basic carbonates. All other silicates are reducible to the same type as the spinels, n $(M_2 O_2)$, the formula of silica itself being written si O. (Si being represented by one-third its usual equivalent.... Boric, titanic, tantalic, and niobic acids are reduced to the same formula as silica."

"Homœomorphous species have similar equivalent volumes, so that the density in species thus related enables us to determine their comparative equivalent weights, and to fix their positions in a homologous series. The proportion between the silica and the other oxides may vary greatly in related species, while the characters of the genus or the order are preserved. This is illustrated in hornblende, diopside, and aluminous pyroxenes like hudsonite.... The triclinic feldspars, of which albite and anorthite are the representatives, furnish another example; the one is a lime feldspar, the other a soda feldspar, and both may be reduced to a common formula, $M_{64} O_{64}$. Petalite, a lithia feldspar, also enters into the same formula, with a similar equivalent volume, while orthoclase belongs to a homologous genus, which is $M_{60}O_{60}$. The formulas with their densities and equivalent volumes, are as follows:—

		Density.	Eq. Vol.
Anorthite	$(Si_{32}\,al_{24}\,Ca_8)\ O_{64}$	2.76	405.0
Albite	$(Si_{48}\,al_{12}\,Na_4)\ O_{64}$	2.62	402.4
Petalite	$(Si_{51}\,al_{10}\,Li_3)\ O_{64}$	2.45	401.5
Orthoclase	$(Si_{45}\,al_{12}\,K_3)\ O_{60}$	2.56	402.6

Between anorthite and albite, may be placed vosgite, labrodorite, andesine, and oligoclase, whose composition and densities are such that they all enter into the same general formula with them, and have the same equivalent volume. The results of their analyses are by no means constant, and it is probable that many, if not all of them, may be but variable mixtures of albite and anorthite....The small portions of lime and potash in many albites, and of soda in anorthite, petalite and orthoclase, are to be ascribed to mixtures of other feldspar species."

These views were enunciated in the language, which we have purposely transcribed literally, twenty-three years ago in the American Journal of Science for September, 1854.

In 1865, in a memoir published in the Proceedings of the Academy of Sciences of Vienna, and of which an abstract was published in the same year in the Annalen der Physik und Chemie, Tschermak adopted these views of Hunt, but in such a manner as greatly to impair their original value and significance. He states that Hunt had enunciated the proposition, that the triclinic feldspars are to be looked upon as mixtures of lime and soda feldspars. But on the ground that the analyses show in numerous instances the lime and soda feldspars are present in molecular proportions, he regards this mixture as a mixture in definite relative proportions, or in other words. a molecular combination. He makes oligoclase consist of ten molecules of albite and three of anorthite, labradorite of two of albite and three of anorthite, with many intermediate feldspars, composed however in every instance of definite numbers of molecules. In these views he has been followed by Rammelsberg in the late edition of the Handbuch der Mineralchemie, 1875, who, after crediting Tschermak with having originated the theorem—that all lime-soda feldspars are to be regarded as isomorphous mixtures of anorthite and albite, applies it to the computation of rational formulas for labradorites as individuals comprised under a general labradorite formula of n molecules anorthite combined with one molecule of albite. It is held by Rammelsberg, that this general formula is sustained by the results of all properly performed analyses of such feldspars, and if these results do not admit of being represented by a certain ratio between molecules, they are to be set aside as uncertain. It is difficult to understand how the term mixture can be properly applied in this case, and in what way such mixtures of n molecules of anorthite and one molecule of albite differ from a chemical compound between anorthite and albite in these proportions. If there is a difference, then the forces concerned in the crystallization of isomorphous substances, must operate to produce a mixture in definite molecular proportions — a supposition not at all in accordance with what takes place in the crystallization of isomorphous artificial salts. Moreover this doctrine excludes from the category of labradorites, many minerals eminently characterized by all the distinctive peculiarities of this species. Notably is this the case in regard to the four following Canadian labradorites: I. A bluish-white granular homogeneous translucent variety from Rawdon. II. A similar rock from Château Richer, pale bluish or greenish-gray, with red spots. The lustre on the cleavage surfaces of the grains is vitreous, but elsewhere waxy. The rock contains small scattered flakes of black mica. III. A bluish opalescent cleavable feldspar from Morin. IV. Lavender-blue cleavable feldspar, with gray opalescence.*

	I.	II.	III.	IV.
Sp. Gr.	2.69	2.68	2.684–2.695	2.697
Silica	54.45	55.80	54.20	54.70
Alumina	28.05	26.90	29.10	29.80
Ferric Oxide	0.45	1.53	1.10	0.36
Lime	9.68	9.01	11.25	11.42
Magnesia		0.27	0.15	Tr.
Potash	1.06	0.86	undet.	0.23
Soda	6.25	4.77	“	2.44
Water	0.55	0.45	0.40	0.40
	100.49	99.59		99.35

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* Hunt, Geology of Canada, 1863, Chap. xvii, p. 478.

The quantivalents ratios for $R^{II}_2 : R^{VI} : Si^{IV}$ are for I, 1 : 3 : 6.6, in II, 0.9 : 3 : 6.9, in III, — : 3 : 6.2, in IV, 0.84 : 3 : 6.2. It will be seen that these ratios differ from the ratio, 1 : 3 : 6, which is the mean for the labradorite species, by an excess in the silicium. This is due, probably, to the same excess of uncombined silica over the amount needed to form the labradorite, as we have previously noticed was characteristic of the Adirondack norian labradorites. The atomic ratios are for:—

	Na : Ca	Al : Si
I.	1 : 1.8	1 : 3.2
II.	1 : 2.3	1 : 3.5
III.		1 : 3.2
IV.	1 : 5.8	1 : 3.1

But these numbers do not permit a structural formula made up of n molecules of anorthite and one of albite. They are, however, entirely compatible with Hunt's original theorem, which, freed from the misconceptions that have since impaired its value and significance is—That the triclinic feldspars, of which albite and anorthite are the representatives, are members of a series, whose composition and densities are such that they all enter into the same general formula with them, and have the same equivalent volume, and it is probable that many, if not all of them, are but variable mixtures of albite and anorthite.

The only feldspar in the series collected, which differed so strikingly in its characters from those whose analyses are given as to demand a separate quantitative analysis, was that forming the non-norite rock (a), which we have already found was excluded from the category given in Part II, and formed as a base, along with quartz, a red granitic rock. Its composition is

Silica	76.18
Al_2O_3	12.41
Fe_2O_3	2.97
CaO	0.11
MgO	0.22
K_2O	5.19
Na_2O	3.23
	100.31

Its specific gravity, as before stated, is 2.635. Its analysis was concluded, before the importance of determining the percentage of titanic acid and ferrous oxide, was realized. It is difficult to determine from the results of the analysis, the constitution of the feldspar present.

As a representative of the intrusive masses, which in very numerous localities, present themselves among the norian rocks, specimen No. 21, which is a black-grey, fine-grained dolerite, breaking with conchoidal fracture, was analyzed. Its specific gravity in mass was 2.89, in powder 2.92. An analysis was made upon the original rock I, upon the portion soluble in acid II, and upon the insoluble portion, III.

Dolerite.

	I.	II.	III.
Silica	43.41	......	43.410
Titanic Acid	0.35	0.367	......
Carbonic Acid	2.00	2.003	......
Alumina	19.42	9.097	10.324
Ferric Oxide	5.72	4.553	1.169
Ferrous Oxide	6.69	6.693	......
Lime	9.11	7.398	1.711
Magnesia	5.98	5.285	0.695
Potash	0.47	0.323	0.144
Soda	4.39	0.530	3.864
Water	3.00	2.997	......
	100.54	39.246	61.317

The insoluble portion, by direct weighing, amounted to 60.78 p. c. Speculations as to the nature of its mineral constituents will be found in Part IV, No. 21. The most singular fact concerning it, is the large percentage of the pyroxenic ingredient, which appears to have gone into the acid solution.

In order to determine the nature of the pyroxenic portion of these norian norites, two minerals were selected : I, Black, with sub-metallic lustre, breaking into cleavage masses, with surfaces an inch or more in width, occurring in seams in the labradorite of Mt. Marcy. Specimen analyzed was from near summit. Its microscopic characters are given under Part IV. Sp. Gr. 3.459.

I. HYPERSTHENE.

		O Ratio.	Radicals.	At. Ratio.	Quant. Ratio.	
Silica	50.33	26.842	23.488	0.8389	3.3554	2
Titanic Acid	0.07	0.028	0.042	0.0009	0.0035	
Alumina	3.36	1.566	1.794	0.0229	0.1973	
Ferric Oxide	1.03	0.309	0.721	0.0064	0.0386	1
Ferrous Oxide	19.40	4.311	15.089	0.2716	0.5432	
Manganous Oxide	0.71	0.160	0.550	0.0029	0.0058	
Lime	2.77	0.791	1.979	0.0495	0.0989	
Magnesia	21.40	8.553	12.847	0.5353	1.0706	
Water	1.14	.....	......	......	......	
	100.21					

The other variety, II, occurs in broadly-foliated, dark-green masses, with a metallic lustre, and specific gravity 3.386.

II. DIALLAGE.

		Radicals.	Eq. Ratio.	
Silica	46.28	21.600	3.086	2.1
Titanic Acid	0.59	0.354	0.028	
Alumina	7.38	3.927	0.432	
Ferric Oxide	2.21	1.547	0.084	1
Ferrous Oxide	14.80	11.510	0.411	
Lime	18.78	13.410	0.670	
Magnesia	8.91	5.346	0.445	
Water	1.115	......	......	
	100.065			

These two minerals represent the most important varieties of the pyroxenic constituent in these Adirondacks, although others occur as well, together with hornblende, the latter as is shown by the microscopic examination of the sections, being frequently derived from alteration of the foregoing.

I have the pleasure to acknowledge the co-operation of my assistants, Dr. G. A. Prochazka and Mr. W. E. Hoyt, in the performance of the foregoing analyses.

IV. MICROSCOPIC EXAMINATION OF ROCK SECTIONS.

The rock-sections, 9 in number, were ground by Mr. A. A. Julien, of the School of Mines, New York. The numbers correspond to those employed in Part II of this article.

a. This section is peculiar, differing from all those which follow as strikingly as the rock itself from the remainder of the collection. It is of a reddish color, interrupted by apparently blank spaces, and spotted with black opaque spots. The red portion is divided up into fine wedge-shaped masses, running one into another, and in polarized light assuming the two phases alternately. It is a highly twinned feldspar, in appearance altogether distinct from labradorite. Numerous amorphous reddish patches, perhaps ferric oxide, are included in it, imparting the color. These and crystals of menaccanite are distributed through the feldspathic portion, the quartz areas being distinguished by an almost entire freedom from foreign matters, and their hexagonal outline.

14. Consists mainly of labradorite, perfectly limpid except where confused particles of undetermined foreign matter are present. These are distributed parallel to the masses of hornblende, and give to the feldspathic matrix its white milky appearance. The hornblende is yellowish-red and strongly dichroic. It is surrounded by light to dark-green masses, which are less dichroic, and are probably pyroxene in course of alteration. The hornblende presents the characteristic cleavage lines, and is sometimes in twinned crystals. The labradorite is finely banded, and so intricately twinned as to give, in connection with the free quartz, of which considerable is present, an unusually beautiful appearance to this section when viewed in polarized light.

It is of great interest to compare these objects, occurring in the norites of the Adirondacks, with similar ones encountered in the labradorites (or plagioclases) of the norites of Sweden, Scotland and elsewhere. As a rule the latter present in the rock-section a tolerably clear field.*

An admixture of microliths of augite and hornblende or magnetite belongs to the less usual occurrences. Fluid-inclusions are not common. But in the plagioclase of the norite of the island of Mull, many very beautiful ones occur, and also in that of the isle of Skye. In the latter, are also black and brownish translucent needles, sometimes 0.06 m.m. long and 0.004 m.m. broad. Grains and small needles, which consist of granules arranged one after another, and also small plates are found in it. The feldspar is filled throughout with excessively minute objects of the same nature as the larger objects.

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* F. Zirkel. Die mikr. Beschaffenheit der Min. u. Gesteine.

The gray or dark color of the plagioclase, has been attributed to similar inclusions occurring in vast numbers. In part, they are fine black needles, usually of equal thickness, and in length at times as much as 0.14 m.m., now and then with acute terminations. They mostly lie in definite directions. There are besides, minute point-like grains, probably the black needles in section. In extremely thin slices, clear brown translucent lamellæ, at times rounded, at times six-sided, make their appearance. A long needle or lamella is often composed of many pieces. They are placed closely one after another, the indented terminations mutually interpenetrating. Frequently, there are found light green bodies, irregularly arranged and in smaller quantities, with rounded and somewhat elongated sides. They are probably hornblende, exhibiting sometimes an angle of 120°. Generally, they are associated with black particles of magnetite. The inclusions are usually met with in the central portion of the individual feldspathic masses. Their edges are ordinarily quite free from them, appearing pure and limpid. Such is the plagioclase of the norite of Krageröe, which while black in mass, is reddish-brown in sections on account of the myriads of yellowish or brownish grains and needles.

The larger six-sided crystals occurring in the labradorite of Hitteröe in Norway, sometimes with reddish or reddish-yellow translucency, Scheerer regarded as specular iron. All the remainder, with few exceptions, are quite opaque and black. Most probably they are not specular iron but menaccanite, a supposition borne out by the customary occurrence of menaccanite in the labradorite of Hitteröe. Besides these, some transparent plates were observed by Scheerer, in part brown, in part green, which appeared to form many-sided prisms, with replacements at both terminations. (They may have been pyroxene in part altered to hornblende.)

20. The labradorite, together with some quartz, is quite transparent and clear. It is traversed by masses of a dark intensely-green pyroxenic ingredient, which are arranged with a certain approach to parallelism. They are cut up by distinct fine lines, also approximately parallel to one another, which impart a fibrous appearance. In part they are feebly dichroic, as if

they had undergone incipient alteration, but for the most part do not alter in tint with crossed Nichols. They were referred to diallage.

In reference to the nature of this pyroxene, the following remarks by Zirkel* are of interest:

The diallage is usually filled with a multitude of foreign microscopic lamellæ and needle-like microliths, and exhibits often a highly fibrous appearance. This occurs upon the principal cleavage plane, the orthopinakoid, and distinguishes it from most augites. By its very feeble dichroism, on which account no manifest difference of tint is obtained on trial with a Nichol's prism, it is connected however with augite, just as through the same property it is distinguished from hypersthene and hornblende. Apart from the difference in chemical composition and its other optical properties, on account of this absence of dichroism, must those constituents of the "Hypersthenites" of Veltlin, of Penig and Neurode, and of the isle of Skye, which were formerly supposed to be hypersthene, be now regarded as diallage.

The diallages in the norites of the Hebrides are in the rock-sections greyish-green and brownish-yellow. They usually abound in small needles, which are arranged in the section in a parallel manner, but present among themselves two parallel-systems cutting one another obliquely. These needles appear to be identical with those observed in the neighboring plagioclase of the norite. They are sometimes dark, sometimes feebly translucent, regular and irregular, of larger or smaller size, disseminated in clusters or in single grains. The Norwegian norites, according to R. Hagge,† from Krageröe, is filled even to the point of opacity with dark brown or black lamellæ, which lie in two directions at right angles to one another. In the Scottish norites from Mull and Skye the gradual conversion of the compact scarcely dichroic diallage into the delicate aggregates of yellowish-green brush-like masses of hornblende, which are at the same time strongly dichroic, can be most distinctly followed.

21. Section of the Dolerite, whose analysis has previously

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*F. Zirkel, ib. p. 181.

†Mikr. Untersuchungen über Gabbro und verwandte Gesteine. Kiel 1871 Quoted by Zirkel, loc. cit. p. 182.

been given. A large portion of the transparent base of this rock, could not be definitely referred by its optical characters to plagioclase. It presents a considerable admixture of quartz. The dark color of the section and rock is due in part to the magnetite and menaccanite, but in still greater degree to very minute light- to dark-green and yellowish-red masses. The former are probably pyroxene, the latter, which are by far the most abundant, hornblende.

36. A rock-section of the very common variety of norite, consisting of a waxy-looking green feldspathic base with brownish-yellow hornblende. Alteration has proceeded to such an extent, that a recombination and re-arrangement of the constituents has in part taken place. The labradorite is represented by translucent areas clouded with a greenish color, but containing no definite green particles. The structure of the labradorite is faintly recognizable, and the banded arrangement of the colors still visible around the edges of the clouded portions, when viewed with polarized light. The amount of free quartz is large, presenting a granular appearance. The diallage has almost disappeared, the original masses being represented only by small areas of deep green color. Instead of them, extensive areas of reddish-brown hornblende, in color resembling some varieties of garnet, are found. This hornblende, in the blowpipe-flame fuses readily with intumescence to a black globule attractable by the magnet.

3. This rock-section is from a mass similar in character to 5, which is the yellowish labradorite, the matrix of the smoky-grey crystals in the porphyritic rock. The composition of this matrix has already been given. It has been seen that it differs in a small but important degree, from the composition of the more highly crystalline portion. The microscope shows that No. 3 contains some free quartz. With a high power, minute crystals of menaccanite are found, along with some black amorphous specks, the character of which was not determined. The diallage is represented by imperfectly crystalline and feebly dichroic masses, which in a few places are slightly altered.

In 5, quartz is also present in the labradorite, and the number of crystals of menaccanite, and possibly magnetite, much larger than in the preceding section. A few masses of pyroxene are apparent, but a slight yellow is imparted to the section by small irregular patches, which have neither the crystallization nor the cleavage of hornblende, more nearly resembling stains of oxide of iron. It is to these that the yellowish tint of the matrix, in which the dark crystalline masses are imbedded, is due.

68. Broadly-foliated dark-green diallage sliced and ground parallel to the laminæ. The most striking characteristic is the striation with fine lines, giving a fibrous appearance. It contains also some particles of quartz and magnetite.

69. Hypersthene occurring in the labradorite from the summit of Mt. Marcy. It is made up of plates or flat, short rhomboidal masses, yellowish-red to opaque. They are very minute, with equally small intervals between them, and are arranged in parallel lines. They are spread through a transparent matrix, which does not present the highly twinned appearance of the labradorite occurring in the other specimens examined, but polarizing magnificently in broad bands of color gradnating one into another and penetrated by quartz. It is probably plagioclase, which has sliced along a section nearly parallel with the brachypinakoïd.

V. GENERAL CONCLUSIONS.

I. That the rocks of Essex county are parts of the Norian System, and are composed of Norites similar to those forming the rock-masses of the same system in Canada, the western part of Scotland, Norway and elsewhere.

II. That these norites are a stratified rock, but have undergone a metamorphosis so profound, as to have caused them to be regarded by Prof. Emmons and earlier observers, as unstratified. The dolerites, which are formed of the same constituent minerals and are of the mean specific gravity of these norites, have probably been formed from a portion of these stratified deposits by deeply seated metamorphic action, and have further modified and greatly tilted the superposed rocks in the course of their extrusion.

III. These norites are marked by the paucity of silica. The hypersthenes and diallages, which mainly compose the pyroxenic portions, are bisilicates in which the deficiency of silica is replaced by alumina. The labradorites are composed chiefly of anorthite, and while uncombined silicic acid is in every case present in them, its quantity is too small to form the more acidic varieties of plagioclase feldspars.

IV. The alkalies are notably deficient, potash being present in minute quantities and potash feldspars wanting. The relative preponderance of earthy bases is further shown by the multitudes of iron-lime-alumina garnets, the most abundant associated mineral. Also by the iron-holding hypersthenes and diallages, and the general occurrence of magnetite.

V. Menaccanite is found universally in both the labradorites and pyroxenes -- a peculiarity noticed wherever the norites have been investigated, and which probably will be found universal.

VI. In the menaccanite of certain localities, over one per cent of chromite has been found — an association apparently not hitherto observed.

STEVENS' INSTITUTE OF TECHNOLOGY,
March 1st, 1877.

ON THE STRUCTURE OF ASTRÆOSPONGIA MENISCUS.

By Drs. J. W. HALL and R. FRITZ-GAERTNER.

Professor Ferdinand Römer, of Breslau, in his interesting monograph upon the Silurian Fauna of Western Tennessee,* and also in that of the Silurian Fossil Fauna of Erratic Boulders found near Sadewitz in Silesia,† has given, so far as we know, the fullest description of this peculiar and characteristic fossil of the Silurian formation of Tennessee.

Referring to Professor Römer, we find this fossil characterized as round, disc-shaped, concave on the upper and convex on the lower side, varying in shape from an almost flat disc to the form of a cup.

The surface of the sponge is covered with regularly shaped stars which also interlace the interior of the sponge, but without regard to order. The branches of these stars are, according to this author, without any connection with those adjacent.

Neither could Professor Römer find any pores in the stars, nor any indications of animal tissue in the interstices in or among them, but considered them only as spines or spiculæ. His separation of the genus Astræospongia from Astylospongia seems to be chiefly based upon the want of regularity in the structure and arrangement of the component parts of the first, and the uniform relative position of the more minute stars in the second, namely, their various branches forming direct lines one with the other throughout the sponge; and also that in this latter genus, there exists evidence of animal matter.

A large collection of these fossil sponges, from the same localities which furnished Professor Römer with his specimens, having been kindly placed at our disposal, for study and comparison, by Professor Hall, Director of the State Museum, we have had opportunity to make the following important observations on their structure:

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*Die Silurische Fauna des Westlichen Tennessee. 1860.

†Die Fossile Fauna der Silurischen Diluvial-Geschiebe von Sadewitz bei Oels, in Nieder Schlesien. 1861.

In order to make the study of the sponge structure more complete, it has been necessary to prepare a number of cuts both vertical and transverse. The machinery and appliances already established in the State Museum enabled us to accomplish this object in a very satisfactory manner.

Besides the polished sections which in themselves were interesting as already indicating organic structure, we have made many transparent preparations for microscopic investigation.

The mineralogical condition of the material infiltrating the sponge was such as enabled us to make the thinnest possible objects for the microscope, and thus subject them to the highest power: though more satisfactory results have been obtained by the use of the lower magnifying powers.

These sections by the assistance of the microscope. and by the aid of photography furnish the material for minute description and the means of exact pictorial representation.

The photographic print being nothing more nor less than a microscopic enlargement transferred by mechanical means from the transparent section itself, to the paper, admits of no such deviations from the original as must of necessity occur where the illustration of a specimen has to undergo the manipulation of the draughtsman and lithographer.

There is much difference in the chemical composition of the various parts of the living sponge, therefore, during the process of petrifaction these different tissues would react and be acted upon in different ways, which in regard to their crystalline molecular arrangement is clearly shown by the use of the polariscope.

There are also chemical differences, which being made use of by the careful application of dilute hydrochloric acid, and in some cases where a more delicate operation is requisite, by the use of acetic acid, show also the peculiarities of the sponge structure.

We have sometimes taken the whole sponge upon which to operate after this manner. Some of the mineral matter having been dissolved, the result was a most exquisitely delicate representation of the form of the sponge during life.

We have also treated some of the microscopical sections with acids, producing most satisfactory results.

The microscopic examination of the sediment left after the etching process, was likewise important, as in many instances we found it, in a great measure, composed, of tubes (perhaps spiculæ) the presence of which we had not before detected in the sponge.

The external form of the sponge has already been given in our description taken from Professor Römer, from a simple disc gradually passing into the form of a cup.

The diameters of our specimens vary from two to eight centimetres, and the perpendicular depth is from one-half to four centimetres.

Judging from the examination of a great number of specimens, that the original form of all these sponges was a simple thin flat disc, containing only one or two layers of colons, it is by the gradual growth and addition of cells and colons that it takes its final cup-like form; the central depth of which is about half the height of the cup.

The convex side of many of the specimens before us show a slight depression, nearly central, and this peculiarity is much more marked upon the flatter specimens. In many cases a well defined star marks the middle of this indentation.

The concave surface, as a rule, exhibits the stars more finely developed and in a much better state of preservation. The central depression is also noticed, in some instances, upon this side, conforming in position to that which appears upon the convex surface; but neither of these depressions seem to mark a point of attachment to any extraneous object. As Professor Römer has already stated, there appears to be no doubt that these sponges were free, either floating in the water or bedded in the mud.

According to Dr. Bronn in his "Thier Reichs," we can conclude, from the minuteness of the pores in the species under consideration, that they inhabited shallow waters; as from observation upon recent sponges it is found that the size of the pores, bears certain relation to the depth of the water in which they live, increasing in size somewhat in proportion to the depth of the water.

Dr. Römer states, evidently from analogy with the recent forms of cup sponges, which are fixed, that these sponges must have grown with the concave side up. There appear to be other reasons in favor of this theory in regard to their position, for instance, as has already been mentioned, the stars upon the concave side are in a better state of preservation, perhaps indicating the newest growth of the sponge, while the appearance of the other side might seem to indicate a loss of organic action and gradual absorption or deposition of calcareous or silicious particles.

Nevertheless, upon examination of the vertical section represented in fig. 3, of Plate 3, we discover lines of tubes, the construction of which we will hereafter describe, commencing at the concave margin and gradually diverging as they approach the convex surface; and supposing the growth of the sponge to be upward, there seems to be but one conclusion, and that is, that the concave must have been the first or lower side.

This position would also account for the stars upon this surface being in a better state of preservation, on account of the protection it would afford them from external wear and accident. It is well known that nearly all fossils, when discovered, show the lower side to have been better protected.

We regret that we have no data from the collector showing the actual position of these specimens in the strata; but, so far as we know, they have been found separate among the debris and decomposed rock upon the surface.

The stars, which go to make up the most noticeable feature of the sponge, are superficially tangential; and from weathering and gradual dissolution of the interfilling substance stand in relief. The star may be described as follows: From a central bead spring six arms, at equal distances, each measuring from two to four millimetres in length, depending upon the individual star from which the measurement has been taken, and each branch diverging from the next at an angle of sixty degrees.

The central bead is a hollow globule bearing a strong resemblance to the independent or originating cell of a recent sponge as figured by Bronn in his "Thier Reichs" (Table 1, fig. 9). Sometimes this globule is slightly compressed upon the upper surface. It has six principal pores (seeming to be six sided) which form the direct communication with the arms or branches. Besides these, there are numerous smaller openings, each having the characteristic stellate appearance.

The branches of the star themselves are made up of smaller beads, gradually decreasing in size as they approach the point, each of these beads being formed similarly to the central cell, namely, being furnished with six principal stellate pores, surrounded by smaller ones which give to the arms a lined or striated appearance. The stellate pores only appear under a magnifying power of about three hundred diameters.

Commencing in the central bead and traceable throughout the line of cells forming the arms of the star, is a tube or spine connecting each with the other, the final point appearing open for external communication.

A *yellowish mineral substance*, mostly alumina, surrounds the stars and seems to have been the skin or epitheca.

Under a high magnifying power, this also exhibits the stellate pores, richly interlaced and crossed by fine spines. These spines, by the use of the polariscope, we conclude to be silicious in their composition, as they show the characteristic bright iridescence indicating quartz.

Upon placing one of the specimens in very dilute acid this yellow material, still retaining its form, floats like a thin membrane attached to the fossil. This fact can only be explained by the great number of spines which thus contribute to its tenacity, and these spines bear the greatest resemblance to those figured by Dr. Bronn in his "Thier Reichs" (Table 1, fig. 12).

The manner of growth has already been indicated in the description of the star, and it appears to be by the gradual development and division of a single cell.

Taking for example a single star for a basis and counting six larger cells to each branch we have thirty-six cells, and the central or germinating bead of these branches would make thirty-seven cells; each of these with an innate power of reproduction by elongation, could produce, if necessary, another mother cell which in its turn could throw off six branches and so on till the necessities of the sponge were accomplished and its growth attained.

But as a rule the general growth would seem to indicate that the function of germination was confined to the central cell.

In fig. 3, of Plate 3, we have given an illustration of a vertical section of one of these sponges. The principal feature observable, is the systematical arrangement of the colons or tubes formed of a number of balloon-shaped cells; these commencing on the concave surface, gradually diverge as they approach the outer or convex side. Taking for example two neighboring tubes, it will be seen that the cells appear to alternate, or the cell of one tube partially fills the space occurring between two of the cells of the next and so on; though exceptions to this mode of growth are observable.

In some of the vertical sections, there appears to be a division marked by a transverse line of cells from which the vertical growth seems to have taken place in both directions at the same time, though the lines of cells diverging to the convex, are more marked and larger than those passing toward the concave surface.

Although stars do occur in making the vertical sections, they appear to be rather the exception than the rule, and can be explained by the fact of the germinating power inherent in the cells forming the branches or side growths.

The mineralogical components are first calc spar which is indicated by the fracture, also alumina which has already been mentioned as composing the greater portion of the tegument, and which can readily be detected by the taste and odor. Blue and red chalcedony are present in variable proportions — in some, hardly observable, and in others forming the greater portion of the body of the sponge. We have also noticed in the specimens under examination that, as a rule, the flat sponges were nearly destitute of this mineral, while the deeper or cup shaped sponges were largely composed of chalcedony.

NOTE. — It is scarcely necessary to remark upon the rapid progress made in the use of the microscope as applied to science during the past few years. Mineralogy and Petrography have already materially advanced through its assistance, and Palæontology has but just entered upon this comparatively new branch of investigation.

The use of these fine microscopic sections in the study of Corals as well as Sponges, and in almost all fossils, will eventually become a necessity and will form a marked era in the progress of the science to which they are applied.

EXPLANATION OF PLATES.

EXPLANATION OF PLATE I.

Agaricus graciloides Peck.

Page 42.

Fig. 1. Two plants of ordinary size; one showing the striatulations of the moist pileus.
Fig. 2. Vertical section of a pileus.
Fig. 3. Transverse section of a stem.
Fig. 4. Four spores × 400.

Helotium caricinellum Peck.

Page 61.

Fig. 5. Piece of a sedge leaf bearing the fungus.
Fig. 6. Two plants magnified.
Fig. 7. Two paraphyses and an ascus containing spores × 400.
Fig. 8. Three spores × 400.

Peziza distincta Peck.

Page 60.

Fig. 9. Piece of a culm bearing six plants.
Fig. 10. A plant with the mouth expanded, magnified.
Fig. 11. A plant with the mouth contracted, magnified.
Fig. 12. A paraphysis and an ascus containing spores × 400.
Fig. 13. Four spores × 400.

Excipula lanuginosa Peck.

Page 52.

Fig. 14. Piece of a stem bearing several plants.
Fig. 15. A young unexpanded plant, magnified.
Fig. 16. An expanded plant, magnified.
Fig. 17. Three hairs × 400.
Fig. 18. Several spores × 400.

Peziza Warnei Peck.

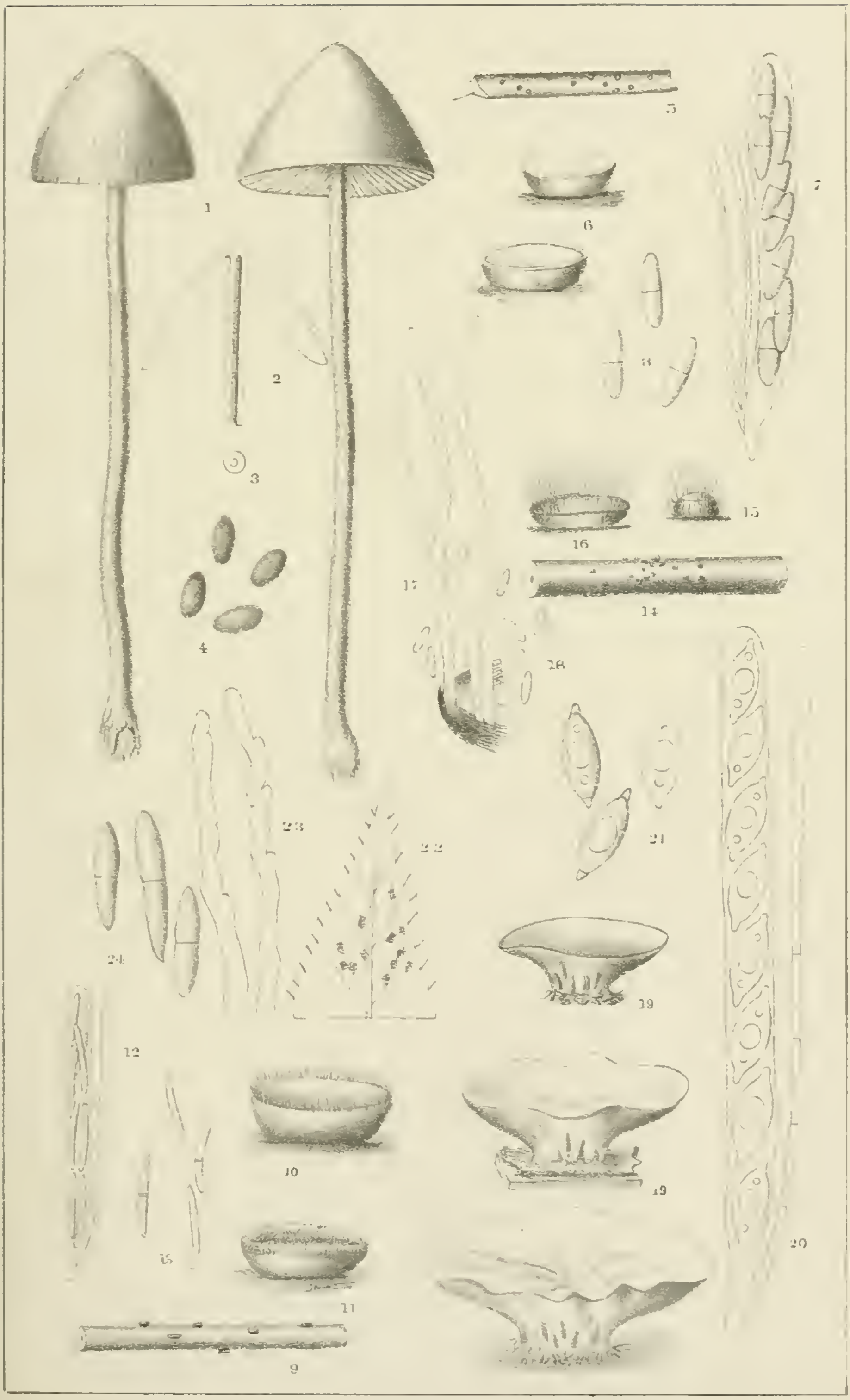
Page 59.

Fig. 19. Three plants of unequal size.
Fig. 20. A paraphysis and an ascus containing spores × 400.
Fig. 21. Three spores × 400.

Cladosporium depressum B. & Br.

Page 54.

Fig. 22. Part of a leaf bearing the fungus.
Fig. 23. Two flocci × 400.
Fig. 24. Three spores × 400.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EXPLANATION OF PLATE II.

DIACHEA SPLENDENS Peck.

Page 50.

Fig. 1. Part of a leaf bearing several plants.
Fig. 2. Two plants magnified, one with part of the peridium removed to show the capillitium and penetrating stem.
Fig. 3. A fragment of the capillitium × 400.
Fig 4. Four spores × 400.

PHYSARUM ALBICANS Peck.

Page 50.

Fig. 5. A piece of bark bearing several plants.
Fig. 6. Two plants magnified, one with most of the peridium removed to reveal the capillitium and slightly penetrating stem.
Fig. 7. A fragment of the capillitium × 400.
Fig. 8. Four spores × 400.

SPHERONEMA AURANTIACUM Peck.

Page 51.

Fig. 9. A piece of bark bearing the fungus.
Fig. 10. A piece of the matrix and two perithecia with globules at the apex, magnified.
Fig. 11. Six spores × 400.

CLAVARIA TYPHULOIDES Peck.

Page 49.

Fig. 12. Piece of a stem bearing six plants.
Fig. 13. Two plants, magnified.
Fig 14. Five spores × 400.

PHYSARUM LUTEOLUM Peck

Page 50.

Fig. 15. A leaf bearing a cluster of the plants.
Fig. 16. A plant magnified, showing the stellately ruptured peridium.
Fig 17. A fragment of the capillitium × 400.
Fig. 18. Four spores × 400.

Plate 2

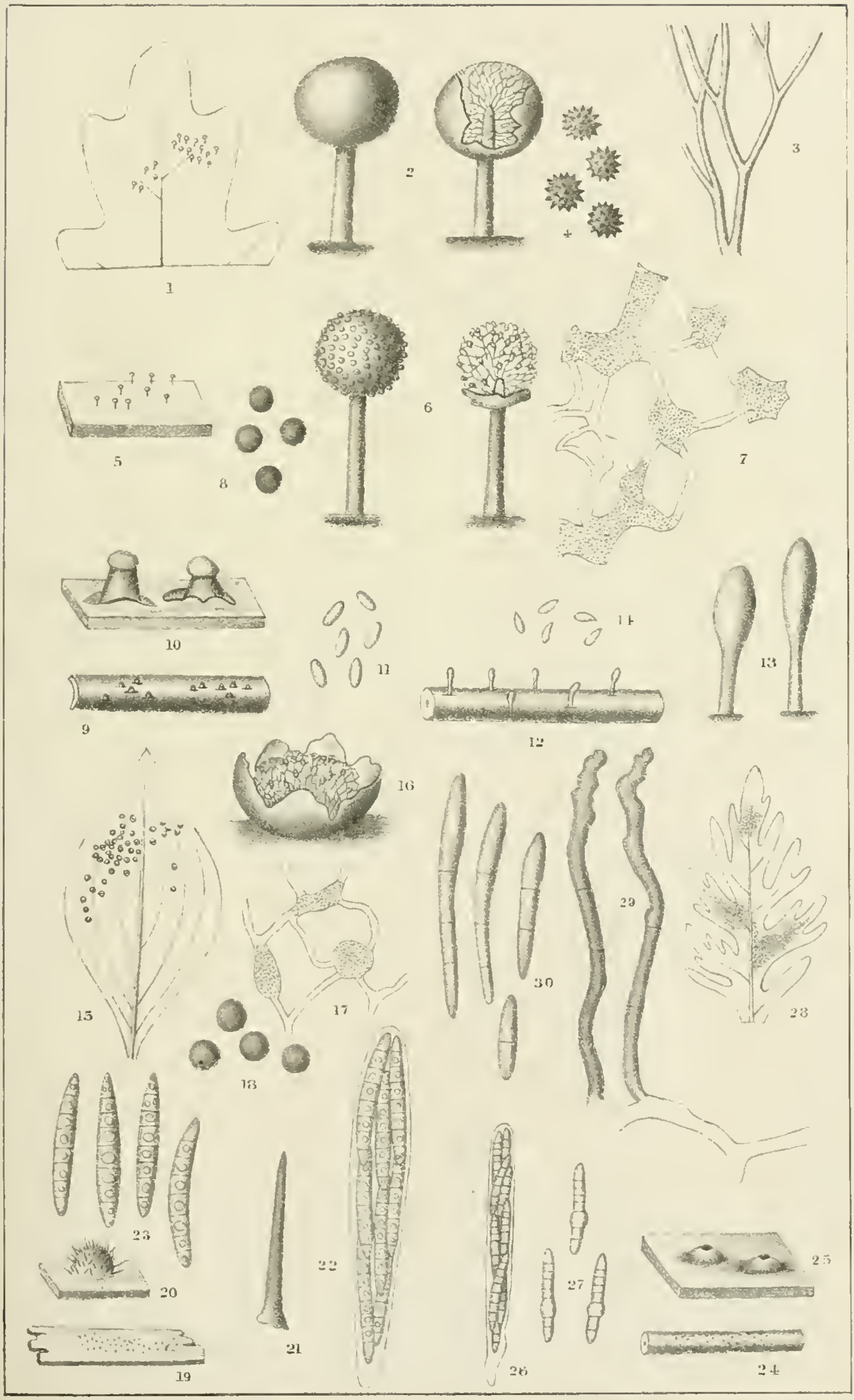
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PLATE II — (*Continued*).

SPHÆRIA CLINTONII Peck.

Page 65.

Fig. 19. A piece of wood bearing the fungus.
Fig. 20. A perithecium, magnified.
Fig. 21. A seta of the perithecium × 400.
Fig. 22. An ascus containing spores × 400.
Fig. 23. Four spores × 400

SPHÆRIA SCAPOPHILA Peck.

Page 66.

Fig. 24. Piece of a scape bearing the fungus.
Fig. 25. A piece of the matrix with two perithecia, magnified.
Fig. 26. An ascus containing spores × 400.
Fig. 27. Three spores × 400.

HELMINTHOSPORIUM ABSINTHII Peck.

Page 54.

Fig. 28. A leaf bearing patches of the fungus.
Fig. 29. Two flocci × 400.
Fig. 30. Four spores × 400.

EXPLANATION OF PLATE III.

ASTRÆOSPONGIA MENISCUS Roemer.

Page 111.

Fig. 1. The convex upper side of an individual of somewhat irregular form.
Fig. 2. The lower side of another individual which is flat or slightly concave in the center
Fig. 3. Vertical section of the ordinary concavo-convex form.
Fig. 4. Lateral view of a specimen of ordinary size and form.
Fig. 5. Horizontal section magnified, showing the character and construction of the stars.
Fig. 6. A single star highly magnified.

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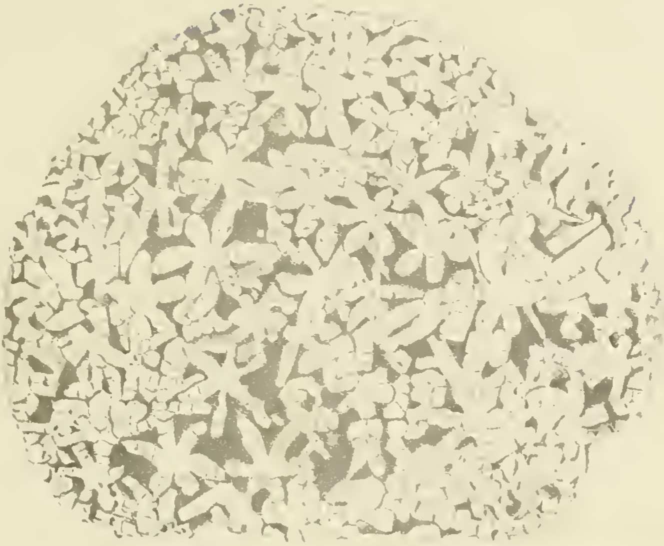

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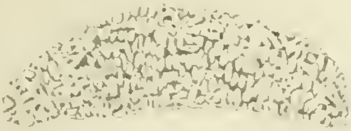

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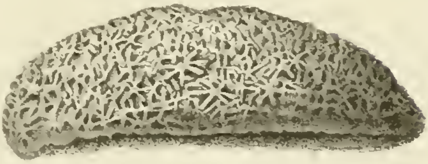

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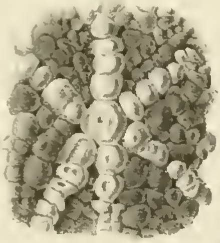

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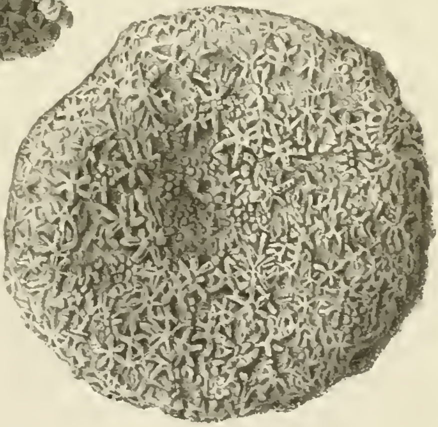

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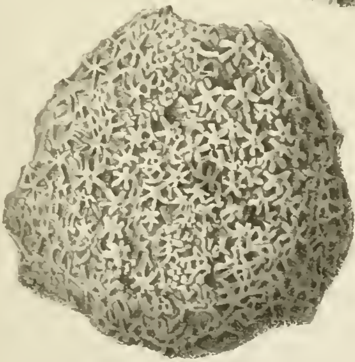

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EXPLANATION OF PLATE IV.

Plumalina plumaria Hall.

Page 255.

Fig. 1. A branching frond, which apparently has been imbedded while in a growing and vigorous condition; all the pinnulæ holding their position and attachment.

Fig. 2. Enlargement of a specimen showing a portion of the rachis denuded of its pinnulæ, except two at the upper extremity.

The apparent annulation is an exaggeration of the characters of the rachis and incorrectly represents the fossil.

Fig. 3. A frond which is somewhat dilapidated, apparently from maceration and decay, while lying upon the sea bottom. The midrib and pinnulæ show the attachment of numerous germs and young (some of them perhaps still in the form of eggs) of a Brachiopod of the genus RHYNCHONELLA or STENOCISMA. The smaller forms present merely flattened spheroidal or ovate bodies, which in farther development show slight evidence of inequalities of the surface, which in a later stage become obscure plications. The pinnulæ, from maceration, gradually fall off, leaving the rachis free, when these germs acquire a farther development, as shown in figures 4 and 5.

Fig. 4. A part of the rachis of a specimen denuded of its pinnulæ, and preserving the young brachiopod still attached. Natural size.

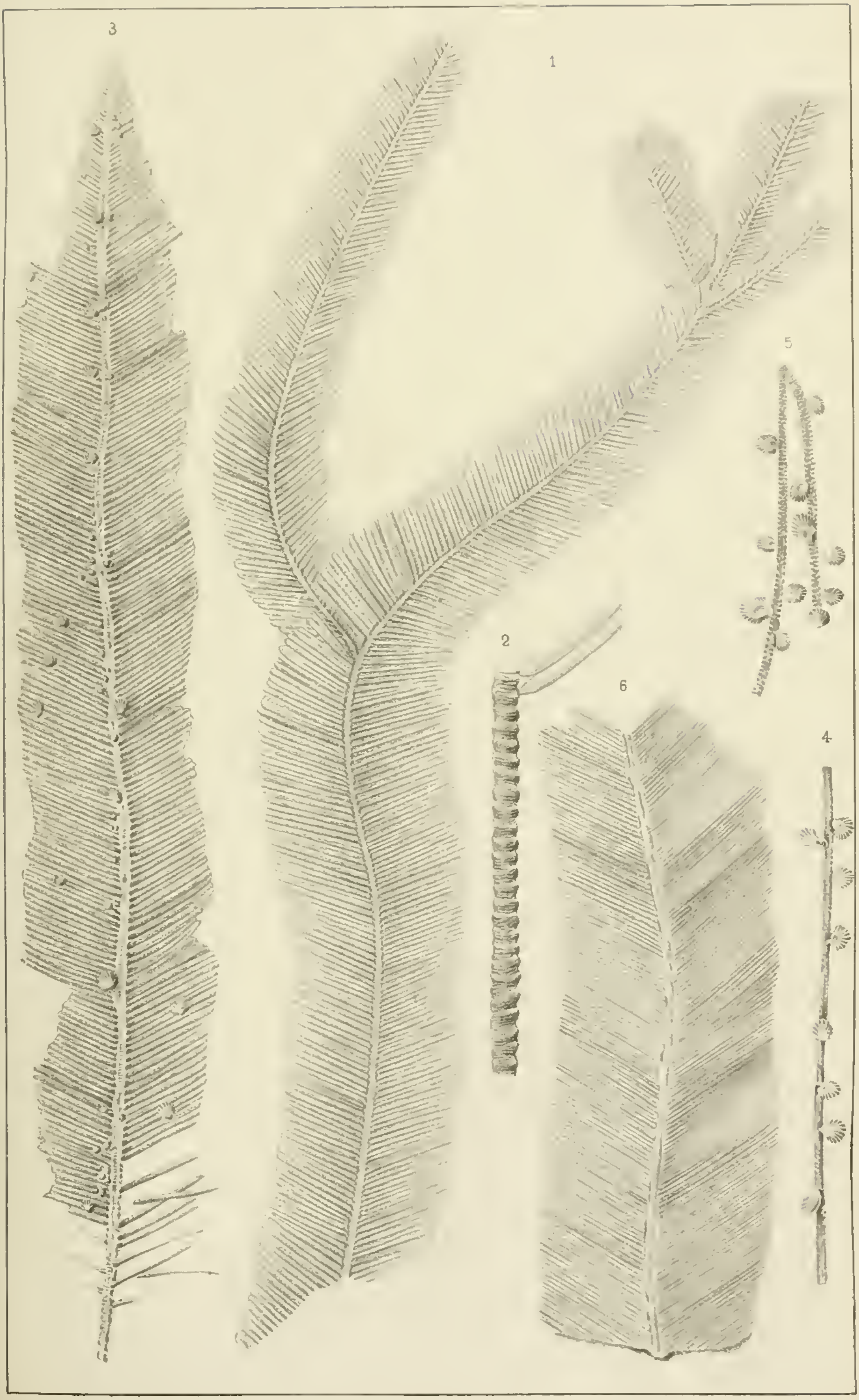
Fig. 5. A similar specimen where the rachis has been bent and recurved upon itself, preserving the brachiopods still attached.

These specimens are from the shales of the Portage group.

Plumalina densa n. sp.

Fig. 6. A fragment of a frond, natural size, in which the rachis is less rigid and distinct, the pinnules narrower, proportionally longer, and more crowded than in the preceding form.

From the shales of the Hamilton group.



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ENTOMOLOGICAL CONTRIBUTIONS—NO. IV.

BY J. A. LINTNER.

I. ON MERMIS ACUMINATA RUDOLPHI.

A PARASITE OF THE LARVA OF CARPOCAPSA POMONELLA.

In April, 1875, an example of this entozoan was received at the State Museum of Natural History, from the Hon. Joseph D. Friend, of Middletown, Orange Co., N. Y., with the request for information in relation to it. Its examination, in connection with the circumstances under which it was found, proved it to be of so much general interest, that the following reply was made to him, through the columns of the *Albany Evening Times*, of April 12th:

DEAR SIR: The "new apple-worm" which you submitted to us a few days since as having been found in a few instances in Orange county, N. Y., during the present season, coiled about the heart of the apple, bore so strong a resemblance to the Gordius, or "hair-worm" as it is ordinarily called, that on its presentation by you I unhesitatingly (but erroneously) referred it to that genus. The brief notice of the new worm, which has appeared in some of our journals, has excited no little apprehension, lest so diminutive a creature, the diameter of a horse-hair, five inches in length, and of the color of the apple pulp—might be introduced in its living state unnoticed into the stomach, and continue its existence as an internal parasite within some of the organs of the body.

The Gordius is not an uncommon animal. Under its popular name of hair-worm or hair-snake (either appellation being given to it, as the particular species or sex noticed approaches its minimum length of about four inches, or its maximum length of twenty-six inches), it has probably come under the observation of most persons living in the country. They are occasionally met with in turning up damp soil, where little groups of several individuals are sometimes found knotted together, occupying a cell in the ground. More frequently they occur in standing water by the roadside and in wagon ruts, in drinking troughs, in old wells, and in small pools on the banks of creeks or rivers. In color, shape and size, they bear so strong a resemblance to a hair from the mane or tail of a horse, as partially to excuse the very general superstition which prevails in relation to them, that they have actually originated from such hairs, and that if a horse-hair be placed in a barrel of rain-water, it will in due time be converted into a living hair-snake. Of course, the more intelligent portion of the community need not be told of the utter impossibility of such a transformation, by which a body devoid of animal life can become a living being. It is a law of nature, without exception, that all animal existence, the lowest as well as the highest, commences with an egg.

The Gordius belongs to that division of the animal kingdom known as the Entozoa, embracing animals which pass a portion of their existence at least, within the bodies of other animals. Our common grasshoppers are frequently infested with Gordii, and I once was so fortunate as to discover an individual in the act of emerging from the head of a grasshopper. They have also been found in crickets, in some of the butterflies, in various species of beetles, in aquatic larvæ of insects as of caddis-worms and May-flies, in the honey-bee, etc.

Much of the history of the Gordius remains unknown. Dr. Leidy has observed the operation of its laying its eggs, in a long, thread-like string, broken asunder in several places, but aggregating the extraordinary length of ninety-one inches, — more than ten times the length of the worm extruding it. The entire number of eggs contained in this oviposition was, by a careful calculation, computed at nearly seven millions (6,624,-800). The young Gordius, microscopic in size, and very unlike its parent in form, has been observed, and its entrance followed into the body of water larvæ, through the thin integuments at the joints of the legs. Their subsequent development during their condition of internal parasites is unwritten.

Upon submitting the specimen with which you favored us, to microscopic examination, it was seen to differ in its internal structure and in its more pointed extremities, from the species of the genus GORDIUS above referred to. As these forms have been so little studied and so little is known in relation to them, it was deemed proper before naming it for you in accordance with your request, to submit it to the eminent authority, Dr. Leidy of Philadelphia, who has given special study to the Entozoa. Having examined it, he returns the following very interesting information: "The worm is a species of MERMIS, a parasite of the larva of *Carpocapsa pomonella*, or apple-worm moth, which accounts for its presence in the apple itself. A similar specimen was referred to me a short time since, for an account of which see the next or forthcoming number of the Proceedings of the Academy of Natural Sciences [Philadelphia]."

MERMIS is a genus closely allied to GORDIUS. Leidy states that he has frequently seen specimens of it, which he calls "the white hair-worm," within insects—in one instance crawling out of a Carolina grasshopper which was struggling in a ditch. Siebold describes *Mermis albicans* of Europe (two to five inches long, of a whitish color) as parasitic in the drones of the honey-bee.

This new phase of parasitism of the Mermis upon a caterpillar living within the apple, at its core, and often in its younger stage within the seeds, is so remarkable and interesting an announcement, that we shall anxiously await the promised paper, for the explanation of much that seems mysterious to us. In what manner, and at what time, does the Mermis effect its entrance in the body of the Carpocapsa apple-worm? The eggs of the apple-moth are deposited on the blossom end of the apple, where the skin is the thinnest, at various periods during the summer months. Hatching within a week, the young caterpillar passes directly into the apple, eating its channel as it proceeds toward the core. Here it remains until it has completed its growth, when emerging from the apple it crawls down the branches, or drops itself to the ground by its thread, to seek some safe place of shelter in which to construct its cocoon. At this time and even during its subsequent hybernation in its larval form within its cocoon, it is exposed to parasitic attack; but this cannot be the period of the entrance of the Mermis, for its presence within the apple indicates its previous existence in the worm. It could not have taken possession of the worm while the apple was attached to the tree, for its structure would not admit of its ascending the trunk and branches of the tree. Should a wonderful instinct lead it to seek its prey through the closely packed excremental matter filling the worm-holes of the "wind-falls" lying on the ground, then the worm in its exit from the fruit, usually very soon after the apple falls, would carry its guest away with it, instead of leaving it behind to excite our wonder and perhaps alarm several months thereafter. Damp cellars would seem to be an appropriate habitat for the Mermis, but its abode within the stored apples would naturally be more brief in this case than in the preceding, the latest worms at this time having attained or being near their maturity. Without the labor of penetrating the apple, its prey could much more conveniently be found in the unchanged larvæ hidden often in immense numbers between the boards of the apple-bins or beneath the barrel hoops within a cocoon too slight to offer any material resistance to the entrance of so thread-like an organism.

The interesting inquiry also arises, is this the first state of parasitism in the cycle of the Mermis' history, or, as would seem more probable, has it already undergone its first transformation from its larval to its perfect form within the body of some other animal, totally unlike our apple-worm? It is to be hoped that Dr. Leidy's observations have enabled him satisfactorily to solve these several enigmas.

As an aid to the development of the history of the interesting animal, it will be of service if as full statements as possible be obtained of the conditions under which it has occurred in each instance in Orange county the present season—the first knowledge we have of its presence in the apple, or any other fruit. Was it found invariably in worm-eaten apples; and if so, had the fruit been much or little eaten? Were any remains of the Carpocapsa-worm noticed as associated with it? Were any living apple-worms seen in the apples eaten during the winter? Where and in what manner were the apples stored in which the Mermis was present? Can it be ascertained if the infested apples were hand-picked or "wind-falls?"

Any replies to the above, or such additional information as may promise to be of service, will be thankfully received at the State Museum.

The great importance of a knowledge of the history of the internal parasites, and the interest connected with them, from the fearful results following the introduction of some of the class within the human body, as for example, the *Trichina spiralis*, is my apology for replying to your inquiries at some length. The detection of the Mermis in the apple, in a few instances, recently, need not, we think, occasion alarm. It is possible that in eating an uncooked apple without the proper mastication, a living Mermis might be introduced into the stomach, for of the Gordius (a closely allied genus as above stated) Leidy says, "It is perhaps the hardest or most resistant to the feel of any of the order, and it is tough and elastic. It is very tenacious of life, and when cut into several pieces will continue to live and move for some time afterward." But should it escape the ordeal of the teeth and pass uninjured into the stomach, there is reason to believe that the action of the gastric juice and other conditions to which it would be there subjected, would deprive it of life before it could pass into the intestines or penetrate the integuments of the body.

Subsequent to the above communication, I addressed another to Mr. Friend, asking for such additional information as he might possess, or be able to obtain in relation to the interesting parasite. In reply he sent me a letter which he had received from Mr. James T. King, of Middletown, stating under date of April 16, 1875, as follows:

I regret to be able to give you but a very meagre report on the apple-worm. Two or three years have passed since the party who gave me the scanty information below, found the first specimen left with me.

The apple in which it was found was a fine looking fall pippin, appeared to be sound, was blown from the tree during a violent wind-storm at night, and picked up the next day.

The worm was coiled up in the fleshy part of the apple, about midway between the skin and the core. It was white, or of the same color as the pulp, and when uncoiled measured seven inches in length, and about one-fiftieth of an inch in diameter. It remained quite active for several hours, and was then placed in alcohol.

The specimen delivered to you was found this winter, but the person who discovered it and brought it to me could give me no definite information in regard to it. * * * *

Accompanying the above, Mr. Friend also writes: —

I send you herewith a letter which I have received from Mr. James T. King, Druggist and Chemist of Middletown. Mr. King forgot to state in his letter, that specimens of the worm have been found in stewed apples, by a family residing in Middletown, somewhat broken up, but in no other way sensibly affected by the heat to which they had been subjected.

Now, that public attention has been so widely drawn to this subject by the publication, in so many of the newspapers of the State, of your recent letter, I think it safe to predict that during the coming summer and autumn much more satisfactory information will be gathered respecting this curious and hitherto unknown parasite.

The above prediction was not verified, and it may therefore be inferred that the parasite is not increasing rapidly, and that its presence in fruit cannot be expected to be of frequent occurrence.

But a single instance of its detection has since been brought to my notice. Prof. J. H. Comstock, of the Department of Entomology, in Cornell University, has informed me that he has in his possession an example of *M. acuminata*, taken in January 29th, of the present year [1876], from a worm-eaten "Seek-no-further." The apple was grown in the vicinity of Ithaca, and had been stored in a bin in a cellar. The fruit had been shaken from the tree, but not allowed, it is believed, to lie upon the ground for any length of time.

Prof. Comstock proposes, during the coming season, to communicate with a large number of pomologists with a view of learning of the distribution, abundance, and such additional facts as may add to our knowledge of this interesting creature.

The first published notice of the detection of the Mermis in fruit (unknown to me at the time of my communication to Mr. Friend), appeared in the Gardener's Monthly, for May, 1872, a periodical published in New-York. A reference to this notice is made in Prof. Riley's Fifth Report on the Insects of Missouri, p. 49, in connection with descriptions of two additional parasites (Hymenoptera) of the apple-worm (*Carpocapsa pomonella* larva), discovered by Prof. Riley.

Mr. P. H. Foster, of Babylon, N. Y., communicates to the Gardener's Monthly, as follows:

I discovered a parasite on the above worm [*Carpocapsa pomonella*] in the year 1869. I sent a specimen to Mr. B. D. Walsh, of Illinois, which he calls a species of hair-snake (Gordius). I also found one last summer imbedded in the apple-worm in the center of a large pear. This Gordius is white. * * * * Prof. Leidy, of Philadelphia * * * describes several, and mentions one which he calls the white hair-worm (Mermis), which is the only one that corresponds with the specimen I have reference to.

Prof. Riley informs me that subsequent to his reference, above cited, he had obtained two specimens of Mermis from Carpocapsa larvæ found in fruit, and two other examples from larvæ taken from beneath bandages placed around the trunks of apple trees, to serve as a place of retreat for the larvæ during their transformations, from which they could be taken and destroyed. He had also taken a similar specimen from the posterior part of the brain of an owl.

The specimen taken by Prof. Riley from the brain of the owl may be presumed to be the same or closely allied to those described by Prof. Wyman,* which he has found so common, in the brain of the snake-bird or water-turkey, in Florida (in seventeen out of nineteen specimens shot), that their presence might be presumed to be the normal condition of the bird. Prof. Wyman finds them to correspond so closely to the *Eustrongylus papillosus* of Diesing, that he thought they might prove to be identical. In every instance they were coiled up on the back of the cerebellum, in numbers varying from two to eight. Figures of them are given, showing the male and female, their position on the cerebellum, enlarged views of their extremities, and the development, within the oviduct, of the egg to the free young embryo. Nothing is known of their transfer from the oviduct, through some other animal probably, to the brain of another bird.

In a subsequent communication to the *American Naturalist* (Vol. VI, p. 560), Prof. Wyman presents very interesting additional observations upon these parasites, and, upon the bird in which they have their habitat, and designates them as *Filaria anhingæ.*

The communication of Prof. Leidy to the Philadelphia Academy, to which reference has been made, in which he describes *Mermis acuminata*, is reported in the Proceedings of the Academy of Natural Science, of Philadelphia, for February, 1875, as follows:

Professor Leidy remarked that Mr. Thomas Meehan had submitted to his examination some worms which had been

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**Proceedings of the Boston Society of Natural History*, October 7, 1868. See, also, *American Naturalist*, vol. III, p. 41, 1870.

found in an apple. They consisted of one entire individual and the anterior half of a second, and apparently pertain to the *Mermis acuminata*, a long thread-worm which has been discovered infesting the larvæ of many insects. Among others, it is parasitic in the larvæ of the fruit-moth of the apple, which readily accounts for its presence in the fruit. Twenty-five years ago (Proc. 1850, p. 117) he had described a worm, belonging to the collection of the Academy, and labeled as having been obtained from a child's mouth, which was evidently the same species. It having been in a child's mouth is probably to be explained by supposing that the child had eaten an infected apple.

The characters of the present specimens of the worm, both females, are as follows: Body filiform, pale fuscous, narrower anteriorly. Head conical, truncate, with the mouth simple and unarmed. Candal extremity thicker than the head, obtusely rounded, and furnished with a minute spur-like process. Length, five inches eight lines; cephalic end at mouth $\frac{1}{12}$ mm.; a short distance below $\frac{1}{5}$ mm.; middle of body $\frac{3}{8}$ mm.; near candal end $\frac{1}{4}$ mm.; mucro $\frac{1}{12}$ mm. long, $\frac{1}{80}$ mm. thick.

We transcribe for comparison the description of the example obtained from a child's mouth, to which reference is made above, together with the accompanying interesting remarks, which show the apprehension entertained by Dr. Leidy, at that time, at least, of serious results which might follow the introduction into the human system through the mouth, of the Mermis and allied species of Entozoa.

Filaria hominis oris.—Body white, opaque, linear, thread-like; mouth round, simple, posterior extremity obtuse, furnished with a short, curved, epidermal hooklet $\frac{1}{500}$ inch in length, by $\frac{1}{2000}$ inch in diameter at base. Length, five inches seven lines, greatest breadth $\frac{1}{66}$ inch; breadth at mouth $\frac{1}{250}$ inch; at posterior extremity $\frac{1}{80}$ inch.

Remarks.—The description is taken from a single specimen preserved in alcohol, in the collection of the Academy, labeled "obtained from the mouth of a child."

Is it a young individual, or perhaps a male of the *Filaria Mendinensis*, or Guinea-worm? The latter, as is well known, infests the human body, often growing to an enormous length, several yards or more, in the inter-tropics of Asia and Africa. It is frequently brought in the body of negro slaves from Africa to America, where no entozoon of the kind has ever been noticed to be parasitic in man, as an indigenous production. From some late observations on the course of life of entozoa, helminthologists have been led to suspect that most and probably all entozoa pass different stages of their existence in different animals. If such be the fact, may not the

Filaria Mendinensis owe its introduction into the human body from the custom which prevails in those countries where the worm is found, of using insect food. Insects are well known to be infested with Filariæ, probably more than any other class of animals. In Egypt, Arabia, etc., the locust is eaten; in Guinea, etc., the larger coleoptera, in the raw state; and in this condition Filariæ may often be swallowed, and reach a higher development of their existence in the human body.

In the same paper, Dr. Leidy describes two additional species of similar Entozoa, — the one (*Filaria canis cordis*) as indicated by the name given it, taken from the heart of a dog. The two examples were white, opaque, linear, nearly uniform throughout, posteriorly subulate, pointed; mouth simple, round. Length ten to ten and a half inches; greatest breadth $\frac{2}{5}$ of a line, anteriorly $\frac{1}{5}$ of a line. The other species (*Filaria boæ constrictoris*), was found in the areolar tissue, in an irregular or tortuous position, between the muscles of the ribs and the integument of a boa constrictor. This was a more robust form, ten inches in length by $\frac{4}{5}$ of a line broad, of a white color and longitudinally striated.

Dr. Leidy has also recently found* the common house-fly (*Musca domestica*, it may be presumed) to be infested with a thread-worm, of about a line in length, which takes up its abode in the proboscis of the fly. From one to three worms occurred in about one fly in five. The parasite was first discovered in the house-fly in India, by Carter, who described it as *Filaria muscæ*, and suggested that it might be the source of the Guinea-worm in man.

In view of these unwelcome suggestions, that it may be a necessary section of the life history of several of these entozoa that they should be introduced into the human body through the food of which we partake, there to undergo their final development, it is much to be regretted that the entire history of all the species to which man is exposed is not yet known. Much attention has been paid to them, but their study has proved a difficult one. A monograph of the Hair-worms, by M. Villet, has recently been published, of which we know nothing beyond the information given in the American Naturalist for December, 1874, to the effect that it was then being published in the "Archives de Zoölogie Expérimentale." The author had found the larvæ encysted in the larvæ of CHIRONOMUS (belonging to the Diptera and aquatic in their habits), and afterward, in September, in the mucous lining of the intestines of fishes, thereby, in conjunction with the previous labors of Grube, Leidy, and Meissner, clearing up their metamorphoses. The larvæ are tadpole-shaped. The habits of GORDIUS seemed quite distinct from MERMIS found living in insects.

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* *American Naturalist*, Vol. IX, p. 247. 1875.

Dr. Speyer communicates to me the information that the occurrence of the Gordiacæa in the body of insects has frequently been observed in Europe, notices of which may be found in several interesting communications from Von Siebold, in the *Stettiner Entomologische Zeitung* for the years 1842, -43, -48, -50 and -54. The species which infests most frequently the Lepidoptera is *Mermis albicans*. They are found in both the larvæ and the perfect insects, oftener in the former. They occur in the larvæ which feed on tall trees, as well as those which live on plants and low shrubs. Wet seasons seem to be more productive of the parasitism, and Dr. Speyer recalls, a number of years ago, during an unusually wet season, his having met with several of such instances. From an example of *Hadena adusta* he had a Mermis emerge, of the length of eight and a half inches, and another from *Hesperia lineola* after it had been pinned. Prof. Von Siebold suggests that a heavy dew may moisten the trunks of trees sufficiently to enable the Mermis to ascend them.

The Mermis parasite (species not stated by Dr. Speyer) also infests the *Carpocapsa pomonella* larvæ in Europe.

These pages have been for some months in type. In the meantime, Dr. Packard's *Report on the Rocky Mountain Locust*, in Hayden's Geolog. and Geograph. Survey of Colorado, for 1875, has been received. In it (pp. 663-667) he gives an account of the several species of GORDIUS and MERMIS occurring in the United States, transcribing from the paper above cited (see full title below *), the descriptions of the Gordii and also the history of *Gordius aquaticus* as given by Villot, carrying it beyond its encysted state in the intestines of fishes, to its free and aquatic state the following spring. This stage it attains by boring through the cyst into the intestinal cavity of the fish, thence passing with the fæces into the water, where material changes take place before it assumes the active stage. For a more full account of these several transformations, see p. 665 loc. cit.

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*Monographie des Dragonneux (Genre GORDIUS Dujardin), par A. Villot. (Archives de Zoölogie expérimentale et générale, tome 3, No. 1, 2. 1874. Paris.)

II. THE NEW CARPET-BUG — ANTHRENUS SCROPHULARIÆ.

During the summer of 1874, notices appeared in various newspapers of the ravages of a carpet-bug, quite different in its appearance and in the character of its depredations from the well-known carpet-moth, *Tinea tapetzella*, which for so long a time had been the only known insect depredator on our carpets.

Its *habitat* was stated to be beneath the borders of carpets where nailed to the floor, eating in those portions numerous holes of an inch or more in diameter. Occasionally it located itself in the crevices left by the joinings of the floor, following which, entire breadths of carpet would be cut across as by scissors. In several instances carpets had been destroyed — new ones as readily as older — and it was questioned whether their use could be continued, in view of a prospective increase of the alarming ravages.

The insect was new to every one, and no one could form a rational conjecture as to what order of the Insecta it belonged. It was described as a small ovate object, about one-eighth of an inch in length, thickly clothed with numerous short bristle-like hairs, and terminating in a pencil of these, forming a tail. It was exceedingly active in its motions, and when disturbed in its concealment would glide away beneath the base-boards or some other convenient crevice so quickly as in most instances to elude capture for its closer inspection. They were found only during the summer months.

In 1876 it was reported in many dwellings in Schenectady, and in the month of July examples of it, for the first time, came under my observation, taken, upon search having been instituted, under the carpets of my residence at Schenectady, where its presence had not been suspected. It was evident, on the first inspection, that it was the larva of a beetle, and in all probability a member of the very destructive family of DERMESTIDÆ, which comprises several of our most injurious depredators on animal substances.

A number of the larvæ were secured and fed upon pieces of carpet in order to rear them. In September they had evidently matured, and had assumed their quiescent pupal state within the skin of the larva, first rent by a split along the back for the escape of the perfect insect. At this stage they presented characters which led me to refer them, in all probability, to the genus ANTHRENUS.

In October, the first perfect insect emerged. Being entirely new to me, they were sent to Dr. LeConte, the distinguished coleopterist of Philadelphia, for determination. He returned answer that they were the *Anthrenus scrophulariæ* — a species well known in Europe for its destructiveness, but now for the first time detected in this country.

Notice of the discovery was communicated by me to the Albany Institute at its meeting of October 17th, 1876, and a report of the same published in the *Albany Argus* of October 21st. Owing to the interest attached to the introduction in our country of another addition to the already formidable list of injurious insects of European origin, the paper, or extracts therefrom, appeared in several of the journals of this and adjoining States. Through the publicity given it, I became informed of the presence of the insect in many localities in New York and other States. Examples of a beetle, believed to conform to the brief description which I had given of *A. scrophulariæ*, and known to possess the like habit of feeding upon carpets, were sent to me by Mr. A. S. Fuller of the *Rural New-Yorker*, for comparison. The species had been in his cabinet for some time, under the name of *Anthrenus lepidus* Le Conte, having received the first examples from Oregon in 1871 or 1872. Later, in 1874, specimens referred by him to the same species were found abundantly in a dwelling in Market street, New York, and thereafter in various parts of the city and neighboring localities. The examples reared by Mr. Fuller from larvæ taken in New York city were clearly identical with *A. scrophulariæ*. Upon informing Dr. Le Conte that examples of this species were in cabinets under the name of *A. lepidus* and requesting an explanation, he wrote me that the latter name had been given by him to a form which he had found on flowers at San Francisco and San Jose in 1850;[*] that it differed from the *A. scrophulariæ* of Europe in its sutural line being white instead of red; but that in all probability it should only be regarded as a variety of the European species.

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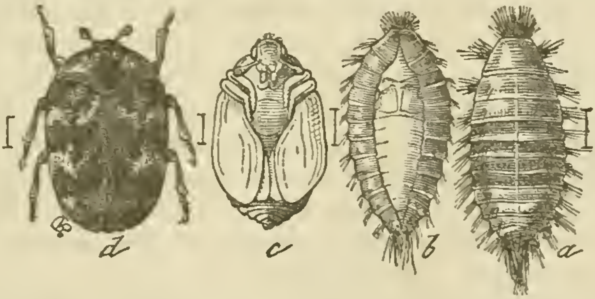
[*] *A. lepidus*, breviter ovatus, supra niger, thoracis lateribus albo-squamosis, gutta nigra inclusa, elytrus fasciis tribus angustis suturaque albo-squamosis, macula antica suturali aureo-squamosa ornatis, basi parce albo-squamosis. Long. .11 in San Diego, Cal. — *Proc. Acad. Nat. Sci. Phila.*, 1854, p. 112.

Dr. Le Conte suggests that it may have been imported into California from Southern Europe during the Spanish occupation of that country. The eastern invasion of the insect, he believes to have been within a few years through the importation of carpets at New-York.

The accompanying figures, very faithfully drawn by Prof. Riley, represent *A. scrophulariæ* in three of its stages, viz., *a* the larva, *c* the pupa, and *d* the imago or beetle. At *b*, the skin of the larva, after the beetle has emerged from the fissure on the back, is shown. The figures are enlarged — the lines beside them representing the natural size.



The larva — the form in which it is usually found when pursuing its ravages beneath the carpets — measures, at maturity, about three-sixteenths of an inch in length. A number of hairs radiate from its last segment in nearly a semicircle, but are more thickly clustered in line with the body, forming a tail-like projection almost as long as the body: this terminal pencil of hairs is not shown in its full extent in the figure, doubtless taken from an immature individual. The entire length of the insect, including the pencil of hairs, is, in the largest specimens, nearly three-eighths of an inch. Measured across the body and the lateral hairs, its breadth just equals the length of the body. An ordinary magnifier will show the front part of the body, where no distinct head is to be seen, thickly set with short brown hairs, and a few longer ones. Similar short hairs clothe the body — somewhat longer on the sides, where they tend to form small tufts. Towards the hinder end may be seen on each side three longer tufts (thrice as long) projecting laterally; but these are not always visible, as the insect by the aid of a peculiar muscular arrangement, has the power of folding them out of sight along its sides. The body has the appearance of being banded in two shades of brown — the darker band being the central portion of each ring, and the lighter, the connecting portion of the rings, known as the incisure. By turning it upon its back, the six little legs, of which it makes such good use, can be seen, in vigorous efforts to regain its former position — its struggles while in this condition sometimes producing a series of jumps of about an eighth of an inch in length.

Having attained its full growth, it prepares for its pupal change without the construction of a cocoon or any other provision than merely seeking some convenient retreat. Here it remains in a quiet state, unaltered in external appearance, except somewhat contracted in length, until it has nearly completed its pupation, when the skin is rent along its back, and, through the fissure, the pupa is seen. A few weeks having passed, the pupal skin in its turn is split dorsally, and the brightly colored wing-covers of the beetle are disclosed. Still a few additional days of repose are required for its full development, when the now fully matured beetle crawls from its protective coverings of pupal case and larval skin, and appears in its perfect form — its final stage.

The earliest beetles emerge in the month of October, and continue to make their appearance during the fall, winter and spring months. Soon after their appearance probably, they pair, and the females deposit their eggs for another brood of the carpet-eating larvæ.

The beetle is quite small — smaller than would ordinarily be expected from the size of the larva — being only about one-eighth of an inch long by one-twelfth broad. An average of five examples before me gives, length .125 inch, breadth .085 inch. Its form is almost a perfect ellipse as seen from above ; its back and under surface are quite rounded. When turned upon its back, it often for a few moments counterfeits death, with its legs so closely folded to the surface as scarcely to be seen, and in this state the ordinary observer might be at a loss to know the lower from the upper side.

It is a beautifully marked little insect in its contrasting colors of white, black and scarlet, arranged as follows : The edge of each wing-cover, where they meet on the back, is bordered with red (forming a central red line), with three red projections from it outwardly — one on the middle of the back, and one other toward each end. Take a straight line and divide in four equal parts by three cross lines, and we have nearly the position of these projections. At the extreme tip of the wing-covers is a widening of the bordering line, making almost a fourth projection from it. The first projection, near the head, is connected with a white spot, running upwardly on the middle of the front border of the wing-cover. On the outer border of the wing-covers are three white spots nearly opposite the red projections. The intermediate spaces are black. The segments of the body beneath are covered with pale red scales, and the thoracic region (which bears the legs) with whitish scales.

The above description, although not presented as a scientific one, will suffice for the identification of the beetle when met with.

The detection of this insect adds to our fauna another species of the dreaded genus of ANTHRENUS, which there is reason to fear will equal in its destructive agency the well-known museum pest, the *A. varius* (formerly known as *A. musæorum*), the obtrusive guest of all our collections of natural history, whose ravages it seems impossible fully to guard against, and so exceedingly difficult to control.

It does not confine itself wholly to carpets, but it also infests and injures various articles of wearing apparel, hanging in closets or lain away in drawers. An instance has also been stated, but awaits confirmation, of its preying upon cotton fabrics—a habit not attaching to either the clothes or carpet moths.

It is known to have become almost ubiquitous in a house which had been for some time occupied by it, notwithstanding the persistent efforts made for its extirpation. Its exuviæ were encountered in trunks, boxes, tied up packages, drawers, beneath floor oil-cloths, etc. Late in the season (October) clusters of twelve or more of the full-grown living larvæ were disclosed, to the disgust and dismay of the housekeeper, in turning over a paillasse, the borders of which they had selected as a safe retreat on which to undergo their final transformation.

I have this present year found that a convenient place in which to discover the beetle, is upon the windows of the infested rooms during the day. In the latter part of April examples were taken upon the windows of my residence at Schenectady. After the middle of May, a systematic search instituted for them, gave several examples each day. In the six days from May 17th to 22d, forty-four specimens were taken from the three windows of two upper rooms. Should investigation show that the beetle is drawn to the windows before the deposition of its eggs, their ready capture and destruction at this time will offer an easy method of preventing their increase.

Should this insect continue to increase until its complete naturalization shall make it as common as *A. varius* (a dozen or more of which may sometimes be seen feeding on a single flower), it is difficult to conceive how, under such a visitation, the comfort of carpets can still be indulged in within our homes. Even now, when it has barely commenced its ravages, it is reported as having inflicted very serious pecuniary losses in several instances, where carpets have been entirely ruined; and such terror has its presence imparted, that not a few prudent housekeepers have already abandoned the customary nailing of their carpets to the floor, that frequent examinations may be made during the summer months for the discovery and destruction of the unwelcome guest.

The remarkable invasion of a dwelling in Cold Spring, N. Y., in the summer of 1874, after a twelve months' absence of the family in Europe, was by a larva of Anthrenus (as determined by Dr. Packard), which is now believed to have been this species. According to the statement made, "they took complete possession, from the cellar to the attic, in every nook and crevice of the floors, under matting and carpets, behind pictures, and eating every thing in their way." From this account we may infer an almost incalculable capability of increase if left to itself, and draw the lesson of the absolute necessity of combatting its invasion by every means in our power.

It will unquestionably prove an exceedingly difficult pest to dislodge. The ordinary applications of camphor, pepper, tobacco, turpentine, carbolic acid, etc., are powerless against it. It has even been asserted that it "grows fat" on these substances. An effectual means of destruction, and preventive against new invasions, is still to be discovered. The free use of benzine has been recommended in some of our journals, to be used in the saturation of cotton, with which to fill the joinings of the floors and crevices beneath the base-boards. This is to be done during the winter months, at which time the insect will be occupying these retreats, either in its perfect beetle form, or as eggs deposited for another brood; to either of these the direct application of benzine would be fatal. To some of my correspondents I have suggested the pouring of kerosene oil in the crevices of the floors, and filling of all places of retreat with cotton saturated with the oil. I would regard this as less dangerous in its use than benzine, and equally efficient.

The recommendation recently made in several of our newspapers, of the Persian insect-powder for the destruction of the insect, I believe to be of no value. I have not deemed it worth the trouble of experimenting with it, but I have been told by those who have given it a trial that it has been found to be of no avail whatever.

The insect has not as yet become sufficiently abundant in New York to be found resorting to plants for its food. The variety *Anthrenus lepidus*, which was introduced in California sufficiently long ago to permit its complete naturalization, was discovered there, in numbers, feeding upon some of the Compositæ. The *Anthrenus varius* is often found, in its perfect state, taking its food from the blossoms of different plants in the garden or field. I have met with it abundantly on peonies. It has also been found to frequent the rocket flower, *Hesperis matrónalis*, a fragrant and showy perennial.

If the plants known to be attractive to the *A. varius* can be introduced into our houses, and made to flower during the months of April and May, I believe that the carpet-beetles would be drawn to them in preference to windows, perhaps as soon as they emerge from the pupæ.

We are unable to give at the present any precise statement of its distribution. It is known in Oregon, as well as in California. It is believed to be distributed throughout most of the western States, and it is known to occur in various portions of the State of New York.

It is announced as having appeared in considerable force in Syracuse. In Utica it has inflicted serious damage in many dwellings. It has occurred at Buffalo, but not in such numbers as to have originated the name sometimes applied to it—the *Buffalo bug*—a name given to it on the Pacific coast probably, from a fancied resemblance to that animal. Its presence has also been detected in Albany, but no serious ravages have been reported. It has occasioned much alarm in several places in the State of New Jersey. Without doubt it is committing its depredations in many localities where its work is ascribed to the carpet-moth, than which it is a far more pernicious insect.

A lady to whom I was relating the destructive capabilities of the new pest, congratulated herself that her carpets were free from it. The following morning her husband brought to me a beetle which he had taken from his face during the night, which proved to be the creature that I had described to her the previous evening—the abundant presence of which in her home, she had not suspected.

From the serious nature of its depredations as above referred to but in part, the secrecy with which it conducts them, the extreme difficulty with any known appliance of eradicating it—it becomes very important, as a preventive against its alarming increase, that it should, from the outset, be combatted by all the means known to be efficacious against its allied forms, or which may give promise of success as against a new foe.

It may be interesting, in connection with 'the above notice of this last importation, to recall the fact that nearly all of our most injurious insects have been introduced from Europe. Of a long catalogue given by Professor Riley, in one of his valuable reports, a few may be mentioned here:

The Hessian-fly (*Cecidomyia destructor*), the wheat-midge (*Diplosis tritici*), the cheese-maggot (*Piophila casei*), the house-fly (*Musca domestica*), the currant-worm (*Nematus ventricosus*), oyster-shell bark-louse (*Aspidiotus conchiformis*), several species of plant-lice (*Aphides*), the cockroach (*Blatta orientalis*), the croton-bug (*Ectobia germanica*), the meal-worm (*Tenebrio molitor*), the grain-weevil (*Sitophilus granarius*), the bee-moth (*Galleria cereana*), the codling-moth of the apple (*Carpocapsa pomonella*), the cabbage-moth (*Plutella cruciferarum*), the carpet-moth (*Tinea tapetzella*),* the clothes-moth (*Tinea vestianella*), the fur-moth (*Tinea pelionella*),* the currant borer (*Ægeria tipuliformis*), and within the few past years, the asparagus-beetle (*Crioceris asparagi*), and the well-known destructive cabbage-butterfly (*Pieris*

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*Mr. V. T. Chambers finds differences in these two species from the European ones (*Canadian Entomologist*, 7, pp. 124, 125).

rapæ). All of these, and the formidable list might be greatly extended, we have received from Europe, while very few of our native insect pests have been sent in return. Should our late exportation of the Colorado potato-beetle (*Doryophora decemlineata*), prove as injurious in Europe as in this country, which there is much reason to doubt, we shall still be very far from having made a commensurate return. While the few American species which have been introduced in Great Britain and on the continent have not spread to any great extent, in almost every instance where injurious insects have been brought thence to this country, their number and their ravages have been greatly increased. Thus, while the recent advent of the *Anthrenus scrophulariæ* has brought consternation in many of our homes, we have been unable to find any record of its preying upon carpets, or other woolens, in the Old World, where it has been so long known. Even special inquiry made by me of one of the leading Entomologists of Europe, has failed to elicit any such information. It is said there to infest dried meats and similar substances. Perhaps its fondness for carpets is a new taste which its transportation hither has developed.

III. ISOSOMA VITIS SAUNDERS.

THE GRAPE-SEED FLY.

During the early part of September of the present year (1876), a cluster of grapes, in very bad condition, which had been received at the office of the *Country Gentleman*, of Albany, was submitted to my examination, with a request for information as to the cause of the injury or disease. It was accompanied with the following letter from the gentleman in whose garden, at Plainfield, N. J., the grapes had grown:

> EDS. COUNTRY GENTLEMAN.— I send you by mail to-day a single bunch of Walter grape, to ask if you will tell me in the columns of your paper, what is the matter with my grapes. They have been affected in same manner since the first year they bore (now the third year of bearing), but never so badly as this year. The disease attacks all kinds (I have about a dozen), and in different parts of my garden. It shows itself about the time of ripening, and this year promises to destroy the whole crop before they are fairly ready to pick. If this bunch carries well, you will probably notice a berry or two just touched, and you will see that the puncture is very small. Dr. Hexamer thinks it may be sun-burn, but I am sure this is not the trouble, for this very bunch which I send you was cut from underneath heavy foliage, and bunches heavily shaded are just as badly affected as others more exposed. I have watched for bees and wasps, but find scarcely any. Occasionally a single bee will be found sucking the juice of a berry already broken. Neither do I see many birds on the vines, though we have English sparrows in the neighborhood. The vines are very thrifty, and are taken as good care of as I know how to do.
>
> H. R. M.

The nature of the difficulty was so singularly concealed that it was not readily detected by me. A critical examination, however, brought to view the hidden cause, and enabled me to return the following answer:

The injury which threatens to destroy an entire crop of grapes, as above narrated, proceeds from an insect pest which promises to prove very detrimental to the grape-growing interest of our country, and which, therefore, should be promptly met and circumvented by all the means in our power.

The bunch of grapes, as received, contained a large number of shriveled berries, upon which, as also upon nearly every one of the perfect ones, could be seen with the naked eye, a small round dot, in the center of which an elevated roughened surface was visible with a magnifier. The dot marks the spot where a very minute four-winged fly had punctured the skin and deposited its egg. The egg hatching, the larva passes through the pulp into one of the seeds, upon the kernel of which it feeds, and within the empty case undergoes its transformation to its pupal state, having previously provided for the escape of the perfect fly by gnawing an aperture of sufficient size in the seed.

For the detection of this insect, for our knowledge of its habits and transformations, and for its description, we are indebted to Mr. W. Saunders, the able editor of the *Canadian Entomologist*, who first observed the insect, in Canada, in the fall of 1868. It was at first believed by him to be the larva of a curculio, but subsequently was correctly referred by Prof. Riley to the hymenopterous genus ISOSOMA. In the *Canadian Entomologist* for November, 1869, it is described by Mr. Saunders as *Isosoma vitis*. The fly is quite small, being but about one-sixth of an inch in spread of wings; its head, thorax and abdomen are black, the wings clear and iridescent, and the legs brown and black. The species is interesting from its belonging to the same genus with the destructive joint-worm fly, the *Isosoma hordei* (Harris), which has proved so very destructive to the wheat, rye and barley crops; and, perhaps, even more interesting from a remarkable difference in the sexes, pointed out by the late Mr. Walker of the British Museum, "one of them representing the carnivorous EURYTOMA, and the other the herbivorous ISOSOMA, and thus one species figuratively combines the diminishers of vegetation and the controllers of such diminution."

In an account of this insect Mr. Saunders says: "On the 20th of August, 1868, we observed that many of the berries in the bunches of a Clinton vine, under our care, were shriveling up. On opening the grapes, we noticed that most of the smaller berries — that is, those which had shriveled earliest— contained only one seed, and that of an unusually large size;

but some of the larger withered grapes contained two seeds, each having a dark spot upon its surface. On cutting the seeds carefully open, the kernel was found almost entirely consumed, and the cavity occupied by a small, milk-white, footless grub, with a pair of brown hooked mandibles, a smooth and glossy skin, with a few very fine short white hairs. When at rest, it was nearly oval in form, but when in motion, its body became elongated, varying in length from one-fifteenth to one-twelfth of an inch.''

Mr. Saunders found the larvæ unchanged within the seeds, and quite active. in an examination made in the month of February. Early in July they were still soft, but motionless, and they may have been in the pupa state. On the 9th of August, a number of the perfect insects, dead, were found when the contents of the bottle containing the seeds were turned out upon a piece of white paper. They had probably effected their escape during the last half of July.

It is possible that this insect may not prove so destructive as it threatens to do, by spreading from garden to garden, and throughout our vineyards. If it were left unmolested, under circumstances continuing to favor its increase, it is capable within a few years of compelling the abandonment of the culture of the grape in our country. Hidden within the seeds, it could readily be distributed in the transportation of the grapes to distant markets, through the several States of the Union. This is the first instance that we have heard of its appearance within the United States.

Encouraged by the recollection that at different times in the past, when a destructive insect pest has threatened to pursue its ravages without the probability of its arrest by human agency, some kindly parasite or climatic condition has come to our aid — so we shall hope that in the present instance the little *Isosoma vitis* will not find conditions more favorable to its existence in its new habitat, or others that it may select, than it enjoyed in Canada, where its spread seems to have been, for the time, at least, arrested.

No means, however, should be left untried that promise to arrest and destroy it. Knowing the history of the insect, we are able to state that it can best, perhaps only, be destroyed while in the larval or grub state, or previous to attaining its perfect condition. This may be done by burning all the shriveled grapes, as well as those not shriveled, but showing the dot marking the entrance of the inclosed grub — in short, all infested clusters. Or, the clusters might be buried, with a foot of solid ground above them, through which, the perfect insects if developed under such circumstances, would not be able to penetrate.

Regarding so serious an attack upon the grape as of great economic importance, and with our knowledge of it limited to an experience in a single locality, I deemed it proper to request of the gentleman from whom its announcement had been received, a detailed statement for record, of the circumstances and conditions attending it, as an aid toward working out the life history of a dangerous insect pest, of which so very little was known.

He kindly communicated the following statement:

DEAR SIR — Your favor of 17th November is received. Please accept my hearty thanks. I will gladly take pains to learn what I can next year about the insect and inform you.

I only have a small place in New Jersey, where I live, and in my garden I have some twelve or fifteen vines only. The place I purchased five years ago, built my house and made my garden. The lot was a portion of an old neglected apple orchard. The soil is a light sandy loam, with a sub-soil of clear sand and gravel, running down probably twenty feet. Most of my grape vines are set in a border facing the south-west, trained on a post and wire trellis, with an ordinary picket fence about two feet in the rear — so they have an abundance of light and air.

About 150 feet from this trellis, facing it (hence a north-east exposure), is the rear of my house. On a piazza here I have a Croton vine, very thrifty, and not far away, against an out-house, I have a Catawba, with a south-eastern exposure. These two vines bear largely and are the only ones in my yard, apparently free from the attack of this insect.

Where I previously lived, I never had any trouble worth mentioning with grape enemies, and so was not on the look out for this insect. My grapes bore a very little two years ago (first crop), and I do not remember any appearance of disease. Last year they (or some of them) bore quite a crop, and the grapes were badly injured. Gardeners and fruit growers in my neighborhood, thought the trouble came from heavy and continued rains following a dry spell, the sap starting so vigorously as to burst the berry; I therefore gave the matter not much thought. This year, as you know, many of my vines fruited largely — notably the Concord, Martha, Walter, Croton, Catawba, with a smaller fruitage of Delaware, Hartford Prolific, etc. With the exception heretofore mentioned, *all* were attacked. I noticed it first as the grapes reached their full size, and began to ripen, and I suppose I lost quite three quarters of the fruit on the vines thus attacked.

I do not know how widespread the trouble may be. Some of my neighbors have suffered somewhat, but I think none so much as I. I propose to take pains to get the experience of the fruit-growers around me, and will then, as you request, communicate with you further.

Yours respectfully,
H. R. MUNGER,
PLAINFIELD, N. J.

Notices of "grape-rot," as a serious evil prevalent in various parts of the country, have appeared, from time to time, for the past few years, in our agricultural journals. Its cause has been extensively discussed, many speculations have been advanced, earnest study has been given it, but up to the present time, its occurrence, like that of the pear-blight, has received no satisfactory explanation.

Is it possible that it may be but a phase of a formidable *Isosoma vitis* attack? This question arises, when too late to answer it through examinations the present year. It may be that the conjecture, for such it merely is, may at once be dismissed as without foundation, by those conversant with the disease (of which the writer only knows the name), and can recall in it, conditions inconsistent with those attendant upon the insect attack, as above reported. The shriveling of the berry, its discoloration (its partial decomposition, perhaps, of which no mention has been made), and its dropping to the ground, might easily present most of the features of an ordinary decay.

If the question herewith raised of the identity of the two may not be at once authoritatively answered by the grape-grower familiar with all the phases of the grape-rot, then it will remain as a most interesting subject for determination the coming season. Should the suspicion be verified, and the cause of the wide-spread and growing evil be discovered so singularly hidden within the seeds, then there is scarce a doubt, but that by the sacrifice of one or two crops the progress of the evil can be effectually arrested.

IV. LIST OF LEPIDOPTERA.

COLLECTED BY W. W. HILL, IN THE ADIRONDACK REGION OF NEW YORK.

It is with much pleasure that we present the following record of some recent collections of Lepidoptera from one of the most elevated regions of the State of New York. It is, we believe, the first published local list, of any considerable extent, of the Lepidoptera of the State, and in view of the absolute necessity of such lists to an extended knowledge of the distribution of insects, it will be appreciated by the student. The great interest pertaining to the subject of geographical distribution, and its important bearing upon the derivation and modification of species, is illustrated by the admirable chapter on "The Geographical Distribution of the Phalænidæ of the United States," constituting pages 567–594 of Dr. Packard's *Monograph of the Phalænidæ.*

The enthusiasm of the entomologists of an adjoining State, has led them to explorations of a peculiarly interesting field lying beyond the limits of their own State — the White Mountains of New Hampshire. For successive years, the members of the Cambridge Entomological Club have established a midsummer encampment upon the slope of Mt. Washington, by which, through their protracted sojourn for weeks, and opportunity for collecting crepuscular and nocturnal forms, they have been able to enrich their cabinets and those of their correspondents with many rare boreal species, to accumulate much valuable biological information, and to present local lists of Lepidoptera, Coleoptera and Orthoptera which have been received as special contributions to science.

Meanwhile, the extensive Adirondack region with its numerous lofty mountain peaks, its deep gorges, its hundreds of lakes — perhaps second only to the White Mountains in point of interest to the entomologist of any locality in the United States east of the Rocky Mountains — has been permitted, each year, to bury within itself its entire entomological wealth.

Previous to the collections noticed in this paper, scarce an insect had been drawn from it. At the present, nothing has been reported of its mountain insect fauna. Many new species are doubtless to be discovered there, and the first comparison of its fauna with that of other elevated and more northern regions is yet to be made. It is not impossible (although our eastern friends will not admit the possibility) that the naked summit of Mt. Marcy may yet yield to earnest search another locality for that very interesting butterfly of so restricted range—*Chionobas semidea*, while aspirations less lofty, would in all probability be rewarded by the addition of *Argynnis montinus* to our State fauna.

It is sincerely to be hoped that, from the growing interest manifested in entomology, the numerous accessions to the number of its students, the facility for study afforded by recent publications and in several extensive classified collections — the reproach resting on the Entomologists of New-York, may speedily be removed. And while the thorough exploration of any locality can scarcely fail of bringing to light much new material, the ambitious student may have for his incentive the assurance that in the Adirondack region, and especially among the Adirondack Mountains proper, there is open to him an unexplored field where faithful search will assuredly yield him a most abundant return.

For the valuable information embodied in the following List, in its enumeration of species, dates of apparition, comparative abundance of species and of sex, we are indebted to the zeal of Mr. W. W. Hill, of Albany. Although having but recently devoted himself to entomological study, the ardor with which he has entered upon it, the unwearying industry displayed in its pursuit, and the very satisfactory results thus far attained, give every assurance that the science to which he has so earnestly consecrated his available time, will be materially advanced by his labors.

The collections were made in Township No. 4, of Lewis county, at Fenton's, and its immediate vicinity. The elevation above tide has not been computed, but may be given approximately at 1450 feet.

The larger proportion — perhaps three-fourths — of the Noctuidæ were attracted by light, and taken within the Fenton House. Quite a number were captured "at sugar"; the inexperience of the collector in this usually very successful method made it far less remunerative than under other circumstances it would have been, and than it promises to be hereafter.

It is to be regretted that this List could not present the results of an entire season, instead of being necessarily so partial an exhibit of the Lepidoptera of the region, from the brief time to which the collections were limited. As may be seen from the record, they commenced on July 1st (1876), and were continued until the 21st of August. On the part of Mr. Hill, they terminated August 4th, the subsequent additions having been made by friends sojourning at the place. An absence of one week during this time limits the period of regular collecting to four weeks.

Collections of considerable less extent made during the preceding year (1875) from July 1st to August 4th, are also incorporated with the above. Of the species taken at this time no dates were recorded ; when, therefore, they were not met with during the following season, they appear in the list simply as taken in July or August, 1875.

RHOPALOCERA.

Papilio Turnus *Linn*	July,	1875.
Pieris oleracea (*Harr.*)	“	17, 19, 27, 29 31.
P. rapæ (*Linn.*)...........	“	19, et al.
Colias Philodice *Godart*	“	12, et al.
Danais Archippus (*Fabr.*).....	“	3, 10, 20, 27, 31.
Argynnis Cybele *Fabr*........	“	19, 31.
A. Aphrodite *Fabr*... ...	“	12 to 29. 12 ♂, 5 ♀.
A. Atlantis *Edw*.........	“	4 to 21. 8 ♂, 15 ♀.
A. Myrina (*Cramer*).. .	“	27, 30. 3 ♂.
A. Bellona *Fabr*.........	“	19.
Phyciodes Nycteis *Doubl.*	“	8, 10.
P. tharos (*Drury*).......	“	2, 3, 5, 6, 7, 18. 9 ♂.
P. Batesii (*Reak.*)	“	1875.
Melitæa Phaeton (*Drury*)	“	1875.
Grapta comma (*Harr.*)........	“	14.
G. Faunus *Edw*.........	“	17, et al. 6 ♂, 5 ♀.
G. Progne (*Cramer*)......	“	1.
G. J-album (*Bd.-Lec.*)...	“	1875. Aug. 1. 2 ♂, 2 ♀.
Vanessa Antiopa (*Linn.*)......	“	1875.
V. Milberti *Godart*......	“	1875. Aug. 5.

Pyrameis Atalanta (*Linn.*)	Aug.	1875.
P. huntera (*Fabr.*)	July	27, Aug. 1, 5.
Limenitis Arthemis (*Drury*)	"	5, (15 ♂, 2 ♀) 10, 12, 15, Aug. 1. 19 ♂, 4 ♀.
L. disippus (*Godt.*)	"	1875.
Neonympha Eurytris (*Fabr.*)	"	1875.
N. Canthus (*Linn.*)	"	3 to 19. 8 ♂, 2 ♀.
Satyrus Alope (*Fabr.*)	"	19, 26, 31, Aug. 1. 5 ♂.
S. Nephele (*Kirby*)	"	15, 17, 19.
Thecla strigosa *Harr.*	"	1875.
T. Titus (*Fabr.*)	"	6, 17, Aug. 1, 4. 7 ♂, 3 ♀.
Lycæna neglecta *Edw.*	"	1875.
Chrysophanus Thoe (*Bd.-L.*)	"	1875.
C. Americana (*Harr.*)	"	2, 3, Aug. 1, 5,
Pamphila Zabulon (*Bd.-Lec.*)	"	1875.
P. Leonardus (*Harr.*)	"	1875.
P. Peckius (*Kirby*)	"	18.
P. Mystic *Edw.*	"	2, 3, 4, 5, 12. 7 ♂, 2 ♀.
P. Cernes (*Bd.-Lec.*)	"	2, 3, 4, 5, 12. 6 ♂, 3 ♀.
P. Metacomet (*Harr.*)	"	2, 5, 6, 8, 10, 18. 4 ♂, 2 ♀.
Eudamus Pylades (*Scudd.*)	"	1875.

HETEROCERA.

SPHINGIDÆ.

Sesia uniformis *Grote-Rob.*	July	5, 12.
Daremma undulosa *Walk.*	"	1875.
Smerinthus geminatus *Say*	"	27.

ZYGÆNIDÆ.

Ctenucha virginica (*Charp.*)	July	5 to 18. 10 ♂ 2 ♀.
Lycomorpha pholus (*Drury*)	Aug.	12.

BOMBYCIDÆ.

Callimorpha militaris *Harr.*	July	1875.
Arctia virgo (*Linn.*)	"	"
A. Saundersii *Grote*	"	"
Spilosoma textor *Harr.*	"	"
Orgyia nova *Fitch*	"	26.
Parorgyia Clintonii *Gr.-Rob.*	"	12.
Nadata gibbosa *Walk.*	"	7.

Crocota ferruginosa *Walk.*	July 18, 19.
Dryopteris rosea (*Walk.*)	“ 1875.
Cœlodasys unicornis *Sm.-Abb.*	“ “
Clisiocampa Americana *Harr.*	“ 11, 12, 18, 27.

NOCTUIDÆ.

Pseudothyatira cymatophoroides	Aug. 12.
P. expultrix *Grote*	July 4, 6, 9, 27. 3 ♂, 6 ♀.
Thyatira scripta *Gosse*	“ 30.
Diphthera fallax *Her.-Sch.*	“ 11, Aug. 3. 1 ♂, 1 ♀.
Briophila lepidula (*Grote*)	“ 12.
Acronycta lobeliæ *Guen.*	“ 12.
A. Radcliffei (*Harvey*)	Aug. 26.
A. lepusculina *Guen.*	July 7.
A. Americana *Harr.*	“ 10, 12, 18.
A. brumosa *Guen.*	“ 29, Aug. 3.
A. superans *Guen.*	“ 11, 14.
A. hamamelis *Guen.*	“ 10.
A. dentata (*Grote*)	“ 11.
Micrococlia fragilis *Guen.*	Aug. 2.
M. diphteroides *Guen.*	July 10.
M. obliterata *Grote.*	“ 4.
Agrotis Chardinyi (*Boisd.*)	“ 30.
A. sigmoides (*Guen.*)	“ 3, 9, 10.
A. perattenta *Grote*	“ 1875.
A. conflua *Tr.*	Aug. 1875.
A. perconflua *Grote.*	“ 8.
A. baja (*W.-V.*)	July 26, 30, Aug. 13, 22.
A. Normaniana *Grote.*	“ 1875.
A. rufipectus *Morr.*	“ 29.
A. haruspica *Grote.*	“ 11, 17, 27.
A. bicarnea (*Guen.*)	“ 13, 28, Aug. 5, 15.
A. subgothica (*Haw.*)	“ 1875.
A. herilis *Grote*	“ 27.
A. tricosa *Lintn.*	“ 3, 27, Aug. 2.
A. plecta (*Linn.*)	“ 9, 14, 21, Aug. 7.
A. redimicula *Morr.*	“ 30.
A. pitychrous *Grote.*	“ 1875.
A. murænula *Gr.-Rob.*	“ “
A. ypsilon (*Rott.*)	“ 31, Aug. 1, 8.
A. placida *Grote.*	“ 26.

Agrotis turris *Grote.*	July 30.
A. pressa *Grote*	" 8.
A. prasina (*W.-V.*)	" 17, 27, 29. 4 ♂, 2 ♀.
A. astricta (*Morr.*)	" 15.
Dianthœcia lustralis *Grote*	" 9.
Mamestra purpurissata *Grote*	" 27 to Aug. 8. 4 ♂. 3 ♀.
M. nimbosa (*Guen.*)	" 1875.
M. imbrifera (*Guen.*)	" 4 to 15. 9 ♂, 2 ♀.
M subjuncta *Gr.-Rob.*	" 8.
M. legitima *Grote*	" 10, 13, 15, 29.
M. trifolii (*Esper*)	Aug. 8.
M. lorea (*Guen.*)	July 2, et al. 6 ♂, 5 ♀.
M. renigera (*Steph.*)	" 11 to 31. 6 ♂, 2 ♀.
M. olivacea *Morr.*	" 30 — Aug. 21. 10 ♂. 1 ♀.
Hadena loculata (*Morr.*)	" 3, 11, 16, 30, Aug. 6.
H. devastatrix (*Brace*)	" 12 to Aug. 8.
H. lateritia (*Hüfn.*)	" 3, 9, 10.
H. sputatrix *Grote*	" 8 to Aug. 9.
H. apamiformis (*Guen.*)	" 8.
H. impulsa (*Guen.*)	" 10.
H. arctica *Boisd.*	" 3, 4, 6, 10, 17, 26, 27.
H. lignicolor (*Guen.*)	" 8 to Aug. 7. 3 ♂, 8 ♀.
H. verbascoides (*Guen.*)	" 10, 15.
H. sectilis (*Guen.*)	" 6 to 31. 2 ♂, 6 ♀.
H. modica (*Guen.*)	Aug. 4.
H. Hillii *Grote.*	July 26.
Hyppa xylinoides *Guen.*	" 6, Aug. 15, 19.
Eriopus mollissima *Guen.*	" 1875.
Phlogophora periculosa *Guen.*	" 27, 29, 31. 5 ♂, 3 ♀.
Euplexia lucipara (*Linn.*)	" 1 to 18. 7 ♂, 4 ♀.
Brotolomia iris (*Guen.*)	" 1875.
Nephelodes violans *Guen.*	Aug. 3, 19, 22.
Hydrœcia sera *Gr.-Rob.*	July 12, 14, 16, 17, 27. 5 ♂.
H. nictitans (*Linn.*)	" 27 to Aug. 19.
Achatodes zeæ (*Harr.*)	" 30, Aug. 4.
Leucania pallens (*Linn.*)	" 1.
L. phragmitidicola *Guen.*	" 1875.
L. Harveyi *Grote*	Aug. 9, 19.
L. lapidaria *Grote*	July 9.
L. adonea (*Grote*)	" 10.
L. commoides *Guen.*	" 6, 11, 16, 26. 1 ♂, 5 ♀.

Leucania unipuncta *Haw.*	Aug. 13, 21.
Caradrina fidicularia (*Morr.*)	" 1.
Amphipyra tragopogonis (*Linn.*)	" 19.
A. pyramidoides *Guen.*	July 30, Aug. 4, 6.
Orthodes infirma *Guen.*	" 11.
Tæniocampa oviduca *Guen.*	" 11, 17.
Tæniosea gentilis *Grote*	" 9.
T. perbellis *Grote*	" 6.
Plastenis pleonectusa (*Grote*)	" 1875.
Eucirrœdia pampina (*Guen.*)	Aug. 19.
Anytus sculptus *Grote*	" 21.
Cucullia convexipennis *Gr.-Rob.*	July 3.
C. asteroides *Guen.*	" 3.
C. postera *Guen.*	" 15, 29.
C. intermedia *Speyer*	" 18.
Nolaphana Zelleri *Grote*	Aug. 17.
Plusia æreoides *Grote*	July 3 to Aug.7. 13 ♂, 3 ♀.
P. balluca *Guen.*	" 29.
P. Putnami *Grote*	" 1875.
P. bimaculata *Steph.*	" 6, Aug. 3.
P. precationis *Guen.*	" 28, Aug. 4, 13.
P u-aureum *Boisd.*	" 30.
P. mortuorum *Guen.*	" 11, 30.
P. epigæa *Grote*	" 1875.
P. ampla *Walk.*	" 30.
P. simplex *Guen.*	Aug. 4, 5.
Erastria carneola *Guen.*	July 7, 30, 31, Aug. 1, 7, 9.
E. albidula *Guen.*	" 3.
E. muscosula *Guen.*	" 3, 6, 11.
Leptosia concinnimacula *Guen.*	" 1875.
Lithacodia bellicula *Hübn.*	" 2, 3.
Drasteria erechtea (*Cram.*)	" 29, Aug. 1.
Catocala ultronia (*Hübn.*)	" 31, Aug. 1.
C. Ilia (*Cram.*)	" 8.
C. polygama *Guen.*	Aug. 5.
C. præclara *Gr.-Rob.*	July 31.
Pangrapta decoralis *Hübn.*	" 2, Aug. 17.
Homopyralis tactus *Grote*	" 8, 10, Aug. 7.

DELTOIDÆ.

Pseudoglossa lubricalis (*Geyer*)	July 11 to Aug. 1.
Epizeuxis æmulalis (*Guen.*)	" 1875.

Epizeuxis americalis (*Guen.*)	Aug. 2.
Litognatha nubilifascia *Grote*	July 3, 4.
Zanclognatha lævigata *Grote*	“ 16.
Z. ochreipennis *Grote*	“ 11.
Z. marcidilinea *Grote*	“ 14.
Philometra longilabris *Grote*	“ 4, 9, 11, 14.
Rivula propinqualis *Guen.*	“ 2, 27
Palthis angulalis *Hübn.*	“ 2, 10, 11, Aug. 17.
Renia discoloralis *Guen.*	“ 1875.
R. Belfragei *Grote*	“ 15 to 31. 5 ♂, 2 ♀.
Bleptina caradrinalis *Guen.*	“ 1, 12.
Hypena humuli *Fitch*	“ 15, 21, 29.

PHALÆNIDÆ.

Chœrodes transversata (*Drury*)	July 27 to Aug. 3. 5, ♂ 9 ♀.
*Ennomos magnaria *Guen.*	Aug. 12, 15.
Endropia serrata (*Drury*)	July 1875.
E. bilinearia *Pack.*	“ 8, 9, 10, 13, 14. 10 ♂.
E. effectaria *Walk.*	“ 11, 19, 26.
Ellopia fiscellaria (*Guen.*)	“ 1875.
Sicya truncataria *Guen.*	“ “
Angerona crocataria (*Fabr.*)	“ 6, 8.
Nematocampa filamentaria *Guen.*	“ 17, 18, 19.
Boarmia humaria *Guen.*	“ 18, 30.
B. pampinaria *Guen.*	“ 6.
Paraphia subatomaria *Guen.*	“ 1875.
Synchlora rubivoraria *Riley*	“ “
Ephyra pendulinaria *Guen.*	“ 31.
Acidalia enucleata *Guen.*	“ 1, 13.
†A. quadrilineata *Pack.*	“ 3, 4, 11.
A. inductata *Guen.*	“ 1, 11, Aug. 8.
Stegania pustularia *Guen.*	“ 18, 28, 30, Aug. 4, 11.
Cabera erythemaria *Guen.*	“ 1.
C. variolaria *Guen.*	Aug. 7, 22.
Eumacaria brunnearia *Pack.*	July 28.

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*I cannot agree with Dr. Packard in the reference of this form to the *alniaria* of Europe, the two differing so much in the shape of the wings. Dr. Speyer has remarked of *magnaria*, “near to our *ainiaria*.” Mr. von Meske has recently sent a large number of the eggs of *magnaria* to Dr. Speyer, which will probably furnish the means for such a comparison, in all of the four stages of the insect as will authoritatively decide the question of identity which is raised.

†One example of the species was entirely without lines.

Macaria enotata *Guen.*	July 8, 27.
M. granitata *Guen.*	“ 3, 8, 11, 18, 27.
Phasiane trifasciata *Pack.*	“ 29.
P. mellistrigata *Grote*	“ 30, Aug. 19.
*Thamnonoma brunneata (*Thunb.*).	“ 4. 2 ♂, 1 ♀.
Eufitchia ribearia (*Fitch*)	“ 16, 19, 30.
Caripeta divisaria *Walk.*	“ 1875.
Hæmatopis grataria (*Fabr.*)	Aug. 8.
Aspilates Lintneraria *Pack.*	July 27.
Heterophleps triguttata *Her.-Sch.*	“ 1875.
Odezia albovittata (*Guen.*)	“ 5, 8.
Scotosia undulata (*Hübn.*)	“ 5.
Melanippe hastata (*Linn.*)	“ 6.
M. sociata (*Bork.*)	“ 3, Aug. 17.
M. lacustrata *Guen.*	“ 1, 3, 6, Aug. 5.
M. basaliata (*Walk.*)	“ 3, 27.
Melanthia ruficillata *Guen.*	“ 4 to Aug. 8. 6 ♂, 5 ♀.
Coremia designata (*Hüfn.*)	“ 6, 30, Aug. 17.
C. ferrugaria *Clerck*	Aug. 9.
Cidaria Packardata *n. sp.*	July 27.
C. testata (*Linn.*)	Aug. 15.
C. albolineata *Pack.*	“ 15.
C. cunigerata *Walk.*	July 6—Aug. 17. 7 ♂, 6 ♀.
C. hersiliata *Guen.*	“ 7, 14.
C. truncata (*Hübn.*)	“ 4 to Aug. 22. 5 ♂, 4 ♀.
Spargania magnoliata *Guen.*	“ 11, 15.
Oporabia cambricaria (*Curtis*)	“ 11.
O. 12-lineata (*Pack.*)	“ 7.
†Larentia cæsiata *W.-V.*	“ 10.
Eupithecia miserulata *Grote*	“ 11.

PYRALIDÆ.

Asopia farinalis (*Linn.*)	July 26, 29, 30, 31.
A. devialis *Grote*	“ 12, 13, 17, 18.
A. squamealis *Grote*	“ 9.
Ennychia octomaculalis (*Linn.*)	“ 11.
Desmia maculalis *Westw.*	Aug. 1876.
Botis theseasalis *Walk.*	July 6, 8, 16, 29, 30.
B. plectilis *Gr.-Rob.*	“ 1, 3, 4, 5, 14, 17.
B. marculenta *Gr.-Rob.*	“ 27.

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*Determination of Dr. Packard.

†Determination of Dr. Packard.

Botis badipennis *Grote*	July 30.
B. generosa *Gr.-Rob*....	" 5.
B. hircinalis *Grote*...........	" 4.
B. subolivalis *Pack*..........	" 5.
Scoparia centurialis *W.-V.*.........	" 28.

MICROLEPIDOPTERA.

Galleria cereana (*Fabr.*)....	Aug. 1875.
Crambus girardellus *Clem*.........	July 10.
Crambus præfectellus *Zell*.........	" 3, 17, Aug. 6.
Tortrix cerasivorana (*Fitch*).......	" 17.
Ditula blandana *Clem*.............	" 7.
Sericoris cæsialbana *Zeller*........	" 4.

In the above list two hundred and fifty-four species are recorded, and represented, as in the detailed memoranda preserved by Mr. Hill, but not convenient to reproduce in these pages, in 796 examples, viz. : of the Rhopalocera, 152 ♂'s and 69 ♀'s ; of the Heterocera, 306 ♂'s and 269 ♀'s.

The preponderance of the captures of male Rhopalocera is very marked, being 120 per cent in excess of the females : of the Heterocera, the males exceed the females by only 12 per cent.

The paucity of the Sphingidæ and Bombycidæ reported, is to be explained by the late date at which the collections commenced. Numerous sphinges had been observed, attracted to light, during the month of June. The period of greatest abundance of most of the Diurnals both in species and in individuals had also passed. On the 5th of July, *Limenitis Arthemis* was still abundant, but in worn condition. At this date, Mr. Hill captured of this upland species, as noted above, eighteen examples, upon a moist spot near a stream, three miles distant from Fenton's on the wagon-road to Lowville. Two visits to this locality were afterward made, without obtaining additional examples.

Among the Phalænidæ, are a larger number of northern forms than might have been expected from the comparatively moderate elevation at which the collections were made. The following of the species are recorded by Dr. Packard in the paper before referred to, as circumpolar or subarctic species, "ranging between the isotherm of 32° and 44°, and also following the isothermals of 44° and 48° southward into Colorado and California — in Colorado ranging from an elevation of 8,000 feet to the limit of trees, 11,000 feet:" *Larentia cæsiata*, *Oporabia cambricaria*, *Spargania magnoliata* *Cidaria truncata*, *C. hersiliata*. *C. cunigerata*, *C. Packardata* (populata of Pack.), *Coremia ferrugaria*, *Melanippe fluctuata* and *M. hastata*.*

To these ten species may be added *Thamnonoma brunneata*, which, if the identification of our species with the European *brunneata* and *pinitaria* be correct, also occurs in elevated regions in Europe.

In consideration of their very interesting distribution, we transcribe for these species the localities ascribed to them in Dr. Packard's monograph, adding to his table the new locality given them in this paper.

	Colorado or Pacific Coast or both.	Mt. Washington.	Adirondack Region, New York.	Labrador.	Iceland.	Lapland.	Alps of Central Europe.	Ural or Altai Mts., or both.
Thamnonoma brunneata	..	*	*	..	..	..	*	..
Melanippe hastata	*	*	*	*	*	*	*	*
Melanippe fluctuata	..	*	*	..	..	..	*	*
Coremia ferrugaria	*	*	*	*	*	*	*	*
Cidaria Packardata	*	*	*	*	..	..	..	..
Cidaria cunigerata	..	*	*	..	..	..	..	..
Cidaria hersiliata	*	*	*	..	..	..	..	..
Cidaria truncata	*	*	*	*	*	*	*	*
Spargania magnoliata	*	*	*	..	..	..	..	..
Oporabia cambricaria	..	*	*	..	..	..	*	..
Larentia cæsiata	*	*	*	*	*	*	*	*

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*It will be observed that in several citations in this paper from Dr. Packard, his late generic references have not been followed, as I cannot regard the lists of Hübner as of any authority in nomenclature. I fully concur in the opinions so unequivocally expressed by Guenée, Dr. Speyer, Wallace, Dr. Boisduval (see Canad. Entomol. 8, p. 117.), Dr. Hagen, Edwards and other leading entomologists, that catalogue names (as were Hübner's), have no just claim for precedence over those of properly defined generic and other groups, and that the attempt to introduce them in nomenclature can result only in confusion and other serious evils.

Among these catalogue names of Hübner, "still-born" (Guenée) more than three score and ten years ago, recently galvanized into life, and for which Dr. Packard stands sponsor, are the following from the Tentamen: Epirrita, Petrophora, Rheumaptera, Hydria, Cymatophora; and from the "Verzeichniss" a few years later:

Ochyria,
Philereme,
Operophtera,
Perconia,
Semiothisa,
Deilinia,
Calothysanis,
Eois.
Therina,
Epirranthis.

It is probable that *Cidaria albolineata* should be numbered among the above subarctic forms, although not so included by Packard. The localities ascribed to it are all of northern or high elevations, as Quebec, Brunswick, Me., and the White Mountains. It has never been observed by me in this portion of New York, except upon the summit of the Catskill Mountains.

Phasiane trifasciata of the list, may also prove to belong to the above, — its only other recorded locality being Berlin Falls, Me.

Of the species cited above, *Larentia cæsiata*, *Oporabia cambricaria*, *Spargania magnoliata*, *Cidaria Packardata* and *Melanippe fluctuata* have not been collected in the vicinity of Albany.

Larentia cæsiata from this locality, is an interesting acquisition, it having been previously reported only from high elevations or northern regions, as the White Mountains, at an elevation of between 8,000 and 9,000 feet in Colorado, Okak in northern Labrador, and Caribou Island (Packard). Guenée states that it has the widest distribution of any species of the [Glaucopteryx, Hübner] group, occurring in the mountainous regions of France, Germany, Italy, Piedmont, Scotland, north of England, Iceland, etc., in barren places resting on rocks and the trunks of trees. From its range of variation, different species have been made of it, as *infrequentata* Haw., *flavicinctata* Steph., etc.

Of the Noctuidæ, the following species have not been found in the vicinity of Albany :

[a]Agrotis Chardinyi,
[a]Agrotis conflua,
Agrotis perconflua,
Agrotis rufipectus,
[a]Agrotis astricta,
Dianthœcea lustralis,
Hadena Hillii,
[a]Plusia bimaculata,
[a]Plusia u-aureum,
Plusia mortuorum,
Plusia epigæa.

At the present, we can only venture to indicate as probable subarctic forms, the five species of the above marked *a*. Of these, two are particularly interesting, from their northern and extended distribution and their occurrence in the lower Adirondack region. *Agrotis Chardinyi*=(A. gilvipennis *Gr.*) has been collected in several examples on Anticosti Island, Gulf of St. Lawrence, N. Lat. 49°; it also, according to Staudinger, occurs in Siberia; Guenée cites it as common in Russia. *Agrotis conflua* was found by Mr. Couper to be common on Anticosti Island; it occurs also in Iceland (Staudinger), Scotland (Norman), Switzerland (Grote), Prussia? and France (Guenée).*

The geographical distribution of the Noctuidæ of the United States has not been studied. No attempt has been made to assign the species to distinct faunal provinces, although the material for such an arrangement is unquestionably far more ample than with the Phalænidæ. Much of it is unpublished, although accessible, if sought for, from the various collectors to be found in nearly every State of the Union. It would prove of essential service if every skilled collector would furnish for publication, authenticated lists of the Lepidoptera known to him to occur in his vicinity. These, for greater convenience, could be combined into State Lists, similar to that given by Prof. Snow, of the Lepidoptera of Eastern Kansas.†

The editor of the *Canadian Entomologist*, in appreciation of such work, has made special request for such lists of the Diurnal Lepidoptera,‡ and has arranged for their tabulation previous to publication in the pages of that valuable journal. We feel assurance that lists of the Heterocera would also be gladly received and promptly published.

A very excellent local list, is that given by Mr. Roland Thaxter, in *Psyche*, Vol. II, pp. 34–38, 80, of collections of Noctuidæ, recently made, mainly by himself, at Newton, Mass., and vicinity. It enumerates three hundred and forty-seven species, and is accompanied with statements, in an abbreviated form, of the comparative abundance of each, month of appearance, means of capture of all (whether at light, at sugar, or at rest), and the food-plant of the larva of a number.

In Vol. VII of the *Canadian Entomologist*, pp. 3 and 21, Mr. George Norman records his captures of Noctuidæ at St. Catherines, Ont., during the year 1874, citing one hundred and seventy-four species, with their dates of capture and comparative abundance: the larger number of these were attracted to sugar. In Vol. VIII of the same journal, p. 12, Mr. O. S. Westcott publishes a list of eighty-three species of Noctuas, taken by him at sugar, at Maywood, Cook Co., Ill.

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*For the determination of these species, and of many others, I am indebted to the kind services of Mr. Grote, always most cordially rendered.

†*Transactions of the Kansas Academy of Science*, Vol. IV, pp. 29-59. 1875.

‡*Canadian Entomologist*, Vol. VII, p. 72. 1875.

In a list (still in MS.) of collections at sugar made by me at Schenectady, N. Y., in 1876, two hundred and twenty-six species of Lepidoptera are recorded, embracing a few Bombycidæ, about twenty-five species of Phalænidæ, a few Pyralidæ and Microlepidoptera — the remainder Noctuidæ.

In 1873, lists were given in the 23d N. Y. State Museum Report, of the Butterflies and the Sphingidæ of the State of New York. Similar lists of the Bombycidæ and Noctuidæ are in preparation.

Mr. Henry Edwards, of San Francisco, who has contributed so largely to our knowledge of the Lepidoptera of our western coast, is engaged upon a Synopsis of the Butterflies of the Pacific coast, which is promised for the press during the present year. Mr. Grote has published several lists of the Noctuidæ of Texas. Will not the members of the Cambridge Entomological Club favor us with a list of Lepidoptera collected on Mount Washington, as a companion to Mr. Austin's list of Coleoptera of the same locality.*

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*Catalogue of the Coleoptera of Mount Washington, N. H., with Descriptions of New Species, by E. P. Austin and J. L. Le Conte, M. D.; in *Proc. Bost. Soc. Nat. Hist.*, Vol. XVI, pp. 265-276.

V. COLLCTIONS OF NOCTUIDAE "AT SUGAR."

AT SCHENECTADY, N. Y., IN 1875.

The list below given is a record of collections made between the 7th of July and the close of the season on the 25th of October. It includes all the species of Noctuidæ (one hundred and thirty-one in number) that were captured or observed on the fifty-three evenings devoted to the work — three or four evenings of each week. A few species of Bombycidæ, Phalænidæ, Pyralidæ and some Microlepidoptera were also taken, which are not embraced in the list.

The attempts previously made by me at collecting by sugaring, had been attended with no success. The satisfactory results obtained at this time are to be ascribed to persistent and more extended sugaring than before employed. The locality was not an unusually favorable one, for, instead of choosing a place for the purpose "on the border of some wood," as has been usually recommended, where the proper number of trees of a certain diameter and character of bark could be found, the collections were entirely confined to my garden — not a large one — in the city of Schenectady. It was an unexpected revelation that collections of such a variety and extent could be made within city limits. and in a garden where the presence of flowers undoubtedly interfered with the attractions of the bait. But as the convenient locality of one's own home may not always prove equally productive in other cities, the statement should be made that my residence was within a block of the Mohawk river which forms the northern boundary of Schenectady,—a city of comparatively small size, numbering under 13,000 inhabitants.

The slats and posts of a grape trellis of sixty feet in extent, offered a convenient place upon which to spread the bait: the leaves extending over the slats had been removed, except at intervals, where they were permitted to remain to serve as a cover or a lure to the moths attracted thither. The odor diffused from the area of surface sugared — computed at sixteen square feet — was evidently sufficient to draw the moths from quite a distance beyond the boundary of the garden. Farther experience has shown that a larger quantity of the bait might have been advantageously used in extending it to the fences inclosing the garden, and that the results to be obtained by this method of collecting, are to be measured by the extent of the locality, the area sugared, and the frequency of its repetition, provided the region be one where the Noctuidæ occur in reasonable abundance.

As directions for sugaring have already been published,* they will not be repeated here, but will be given in a paper in preparation, in which the various methods employed in the attraction of Lepidoptera will be detailed.

A brief account of the collections herein noticed was presented at the meeting of the American Association for the Advancement of Science, held at Detroit in 1875. Several of the members present were stimulated to test for themselves the recommendation made of this simple and most valuable means of enlarging their cabinets and extending our knowledge of an interesting and important class of insects. In every instance, it is believed, the results were highly gratifying.

Pseudothyatira cymatophoroides, July 17, 23, 27, 30, 31.
P. expultrix, July 12, 15, 17, 20, 21, 23, 24, 27, 28, 30, 31; Aug. 2, 5, 6, 7, 16.
Habrosyne scripta, July 24, 28, 31; August 7.
Acronycta occidentalis, July 27, 31.
A. Americana, July 14, 20, 21.
A. dissecta, July 24.
A. vinnula, July 7.
Agrotis sigmoides, July 24, 30; August 7.
A. badicollis, August 6.
A. baja, Aug. 16, 18, 19, 21, 25, 26, 28, 30; Sept. 2, 4, 7.
A. haruspica, July 7, 13, 17, 20, 23, 24, 27, 28, 30, 31; August 2, 5, 6, 7, 16, 19.
A. c-nigrum, July 7, 23, 24, 30; August 2, 25, 26, 28, 30; September 2, 4, 7, 9, 11, 13, 15, 18, 30; October 2, 4, 6, 10, 16, 21, 22.
A. bicarnea, July 30, 31; August 2, 6, 7, 21.
A. subgothica, August 2, 19, 21, 26.

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* By Mr. George Norman, in the *Canadian Entomologist* for April, 1875, and by Prof. O. S. Westcott in the same journal for January, 1876.

Agrotis tricosa, August 19, 21, 28.
A. herilis, July 7, 20,
A. plecta July 7, 24; August 2, 5, 6, 7, 16, 18, 19, 21, 25, 26, 28, 30; September 2.
A. sexatilis, August 7.
A. pitychrous, August 30.
A. murænula, August 21, 25.
A. messoria, August 19, 21, 25, 26, 28, 30; September 2, 4, 7, 9, 11, 13, 15, 18.
A. velleripennis, September 2.
A. venerabilis, September 15.
A. annexa, July 31; August 7.
A. ypsilon, July 7, 21, 24, 27, 31; August 2, 5, 6, 7, 16, 19, 21, 25, 26, 28, 30; September 7, 9, 11, 13, 15, 18, 25, 29, 30; October 2, 4, 6, 10, 19, 24.
A. saucia, September 7, 9, 11, 13, 15, 20, 29, 30; October 2, 4, 10, 19, 22.
A. alternata, July 7, 17.
A. herbida, July 7, 8, 10, 12, 14, 17, 24, 28, 30, 31; August 2, 5, 6, 7, 26, 28; September 4.
A. occulta, August 30.
Mamestra nimbosa, July 27, 31.
M. latex, July 7.
M. adjuncta, August 2, 6, 7.
M. subjuncta, July 31; Aug. 5, 7, 19, 21, 26; Sept. 15.
M. chenopodii, July 24, 30, 31; Aug. 2, 5, 6, 7, 19; September 9.
M. albifusa, July 28; August 6.
M. Godelli, June 8.
M. lorea, July 14.
M. renigera, July 7, 21, 23, 24, 27, 28, 30; August 2, 5, 6, 7, 16, 19, 21, 25, 28, 30; September 2, 4, 7, 9, 11, 13, 15, 27; October 2.
M. olivacea, August 25.
Hadena loculata, July 14, 15, 23.
H. devastatrix' July 8, 10, 13, 15, 17, 20, 21, 23, 24, 27, 28, 30, 31; August 2, 5, 6, 7, 16, 18, 19, 21, 25, 26, 28, 30; September 2.
H. sputatrix, July 8, 10, 12, 13, 14. 15, 17, 20, 21, 23, 24, 27, 28, 30, 31; August 2, 5, 6, 7, 16, 18, 19, 21, 25, 26, 28, 30; September. 2.
H. impulsa, July 8, 15.

Hadena apamiformis, July 24; August 6.
H. suffusca, September 7.
H. arctica, July 7, 8, 10, 12, 13, 14, 15, 17, 20, 21, 23, 24, 27, 28, 30, 31; Aug. 2, 5, 6, 7, 16, 19, 21, 25, 26.
H. lignicolor, July 7, 8, 10, 12, 13, 14, 15, 17, 20, 21, 23, 24, 27, 28, 30, 31; August 2, 5, 6.
H. verbascoides, July 12, 13, 14, 17, 20, 21, 23, 24.
H. modica, July 31; August 7.
H. sectilis, September 7.
Perigea luxa, August 7.
Dipterygia pinastri, July 28; August 5, 19, 30.
Hyppa xylinoides, July 28, 30, 31; August 2, 5, 7, 16, 18, 19, 21, 25, 26, 28, 30; September 2, 4, 7, 9, 11, 13, 15, 18, 20.
Laphygma frugiperda, September 15.
Euplexia lucipara, July 10, 21, 31.
Phlogophora iris, June 30.
Nephelodes violans, September 9.
Luperina reniformis, August 2, 5, 6, 7, 18, 19, 28; Sept. 2, 4, 7, 9, 11, 13, 15, 18, 20, 22, 25, 30; October 19, 25.
L. reniformis, v atra, August 19; September 4, 7.
Gortyna sera, July 7, 8, 10, 12, 13, 14, 15 17, 20, 21, 23, 24, 27 28, 30, 31; August 2, 5, 6, 7.
G. nictitans, July 17, 20, 21, 23, 24, 27, 28, 30, 31; August 2, 5, 6, 7, 16, 18, 19, 21, 25, 26.
Leucania pallens, July 31; August 18, 19, 21, 25, 26.
L. phragmitidicola, August 16, 19, 21; September 2.
L. lapidaria, August 7, 16, 19, 28.
L. adonea, July 7, 8, 15, 17, 24.
L. commoides, August 19.
L. unipuncta, July 7, 21; Aug. 7, 16, 18, 19, 21, 25, 26, 28, 30; September 2, 4, 7, 9, 11, 13, 15, 18, 20, 22, 25, 27, 29, 30; October 2, 4, 6.
L. pseudargyria, July 12, 15, 17, 20, 21, 23, 24, 27, 28, 30, 31; August 2.
Amphipyra pyramidoides, July 20, 24, 28, 30, 31; August 2, 5, 6, 7, 16, 19, 21, 26, 28, 30; September 2, 7, 13, 15, 25, 30; October 2, 4, 24.
A. tragopogonis, July 31.
Orthodes infirma, July 7, 8, 10, 12, 17, 20, 21, 23, 24, 27, 28, 30, 31; August 2, 5.
O. candens, July 7.

Tæniocampa oviduca, July 21.

Cosmia infumata, September 4, 9.

Plastenis pleonectusa, July 31 ; August 7.

Orthosia ferrugineoides, September 7, 9, 11, 13, 15, 18, 20, 22, 25, 27, 29, 30; October 2, 4, 6, 10, 16, 19, 21, 22, 23, 24, 25.

O. helva, August 5, 6, 7, 16, 18, 19, 21, 25, 26, 28, 30.

O. sp. (no. 3885), July 12, 17, 20, 21, 24.

Eucirrœdia pampina, September 13 ; October 10.

Scoliopteryx libatrix, July 8, 10, 12, 13, 14, 15, 20, 24, 30.

Xylina disposita, September 9, 11, 13, 25, 27, 29, 30 ; October 4, 10, 16. 21, 22, 23, 24, 25.

X. petulca, September 11, 13, 27, 29; October 21.

X. ferrealis, September 7, 11, 13.

X. Bethunei, September 4, 9, 13, 15, 18, 26, 29, 30; October 2, 10, 23, 24.

X. laticinerea, September 29, 30; October 4, 6, 10, 19, 21, 22, 23, 24, 25.

X. cinerea, September 15, 30.

X. pexata, September 26.

Anytus sculptus, September 7, 15.

Crambodes talidiformis, July 21.

Placodes cinereola, August 16, 19, 21, 25.

Plagiomimicus pityochromus, August 19.

Pyrrhia angulata, July 23; August 5.

Chamyris cerintha, July 23, 24.

Erastria carneola, July 7, 8, 10, 12, 15, 17, 20, 21, 23, 24, 27, 28, 30, 31 ; August 2, 5, 6, 7, 16, 19, 21, 25, 26, 28, 30; September 2, 4, 13, 15, 27.

E. synochites, July 15, 24, 27, 28 ; August 7.

E. nigritula, July 24, 27, 28, 30, 31 ; August 2, 5, 6, 7, 16, 18, 19, 21, 26 ; September 13.

Drasteria erechtea, July 27, 28, 30, 31 ; August 5, 7.

Ophiusa bistriaris, July 14, 28.

Euparthenos nubilis, July 14, 15.

Catocala Meskei, July 24.

C. Briseis, July 24, 28.

C. Ilia, July 27.

C. parta, July 24, 27, 28, 30, 31 ; August 5, 6, 7, 21, 26, 30 ; September 2, 13, 15, 25.

C. ultronia, July 8, 10, 13, 14, 17, 20, 21 23, 24, 27, 28, 30, 31; August 2, 5, 6, 7, 25.

Catocala concumbens, August 26, 28 ; September 15.
C. amatrix, August 21, 28.
C. cara, August 18, 21; September 2, 15, 26, 27.
C. cerogama, August 19, 26.
C. neogama, August 25.
C. habilis, September 15.
C. antinympha, August 26.
C. serena, July 24.
C. Clintonii, July 17.
C. polygama, July 7.
C. pretiosa, July 8, 10, 17.
C. nuptula, July 15, 20, 21, 23, 24, 27, 28, 30 ; August 2, 5, 6, 7.
C gracilis, July 21.
Homoptera lunata, August 26, 30 ; Sept. 2.
Homopyralis tactus, July 7, 8, 10, 12. 13, 14, 15, 17, 20, 21, 23, 24, 28, 30, 31 ; Aug. 2, 5, 6, 7, 16, 18, 19, 25.
Pseudaglossa lubricalis, July 17, 20, 21, 23, 27, 28, 30 ; Aug. 5. 7, 16, 18, 19.
Epizeuxis æmulalis, July 28, 31 ; Aug. 5, 28 ; Sept. 9, 25.
Xanclognatha marcidilinea, Sept. 9.
Clanyma angulalis, July 17, 31 ; Aug. 2, 16.
Renia Belfragei, Aug. 26.
Renia centralis, Aug. 30.
Renia lævigata, July 2.
Bomolocha abalienalis, July 21.
Hypena humuli, Aug. 25, 30 ; Sept. 2, 7, 13, 15, 27, 29 ; Oct. 22,
Plathypena scabra, Aug. 21 ; Sept. 9, 13, 26, 27; Oct. 22, 24.
Tortricodes bifidalis, July 28 ; Aug. 6, 7, 19.
Philometra serraticornis, July 20.

It will be observed from the above memoranda that a large number of the species (no less than forty, or nearly one-third of the whole) were quite rare, appearing on but a single evening, and usually in a single example. This, however, may not be taken as a measure of the actual rarity of the species in this portion of the State of New York. For some of the species other attractions would undoubtedly offer greater inducements. Many species are extremely local in their occurrence, perhaps abounding in a limited locality, and hardly to be found a mile or two distant. And again, the fact is well known to collectors that with nearly all the Lepidoptera, a year occasionally occurs when a species will appear in remarkable abundance. The two examples of the beautiful Noctua, *Chamyris cerintha*, taken as above stated on the 23rd and 24th of July, were very highly prized by their captor from their rarity up to that time. The following year, by the same method of sugaring and from the same grape trellis, between the 10th of June and 17th of August, nearly a hundred examples of it were taken — sixteen in a single evening. Such rarities in 1875 at Schenectady, as *Agrotis pitychrous*, *Agrotis alternata*, *Nephelodes violans*, *Cosmia infumata*, *Xylina ferrealis*, *Xylina pexata*, *Anytus sculptus*, *Catocala Briseis*, *Catocala antinympha*, *Catocala gracilis*, etc., — in 1877 at Center, by the captures there made, were consigned to the rank of common species.

In addition to a knowledge of the abundance of a species, the above and similar records may be serviceable in showing the duration of the period of apparition of the more common species, and also the succession of broods, when they occur.

On the first evening of collecting, July 7th, twenty-one species were taken, of which number one-third were species of AGROTIS. Of those present at this time, three, viz., *Agrotis c-nigrum*, *Agrotis ypsilon* and *Mamestra renigera*, continued into the month of October. In the record of *A. c-nigrum*, three intervals are shown of respectively sixteen days in July, twenty-three days in August and twelve days in September: may not three successive broods be inferred from this? *A. ypsilon* was not observed for the two weeks following July 7th, but continuously thereafter to October 19th, with the exception of five indicated absences of one and two evenings each.

Agrotis baja was captured in several examples on the 16th of August, and was observed each evening until its disappearance on Sept. 7th. The period of duration was probably a month (no collections were made between the 7th and 16th of August), and the same also of *Agrotis messoria*, from August 19th to September 18th.

In *Mamestra renigera*, two intervals appear of sixteen and twelve days each, in July and September.

Hadena devastatrix, *H. sputatrix*, *H. arctica* and *H. lignicolor* were among the most common species, and probably appeared in successive broods, as they were each present when the collections commenced, and two of the species continued into September.

Hyppa xylinoides, commencing the latter part of July, continued through all of August and September into the early part of October.

Luperina reniformis continued throughout August and September, and reappeared in the last half of October.

Leucania unipuncta, after the appearance of a single individual on two evenings in July, was present each evening for the space of two months. It was one of the most common moths at sugar, and was nearly always in remarkably good condition.

Amphipyra pyramidoides, appearing first on July 17th, continued, not every evening, however, for more than two and a half months.

Orthosia ferrugineoides was constant in its presence, and also an abundant species from its first appearance until the close of the season.

Orthosia helva was confined to the month of August, but was uniformly present after the 5th.

Of the Xylinas, *laticinerea* was the last to appear. It was in abundance and in perfect condition at the cessation of sugaring. It was the first to appear the ensuing spring (1876), on the 11th of April, followed a few days thereafter (April 25) by *X. Bethunei*.

Erastria carneola had a long duration, and was very seldom absent, although never appearing in large numbers. It continued until late in September. As it is known to occur in the month of May, its four months presence with us is evidence of a succession of broods, as is also shown in the freshness of examples collected at various times throughout the season.

Catocala parta continued for a very long time, having been taken on fifteen evenings in the months of July, August and September.

C. ultronia was the most abundant of the Catocalas, and, although not seen in the month of September, was observed on eighteen evenings during the preceding two months.

Homopyralis tactus was a remarkably constant visitor, having been unobserved on one evening only for nearly two months.

Pseudothyatira expultrix was present each evening of the month commencing July 15th.

The following table shows the period of duration of several of the species and their comparative constancy of attendance at sugar.

SPECIES.	First noted appearance.	Last appearance.	Evenings absent.	No. of days' duration.
Hadena arctica	*July 7	Aug. 26	1	†51 +
Hadena lignicolor	7	6	0	31 +
Hadena devastatrix	8	Sept. 2	2	57 +
Hadena sputatrix	8	9	2	64 +
Hydrœcia sera	7	Aug. 7	0	32 +
Leucania unipuncta	Aug. 7	Oct. 6	0	61
Erastria carneola	July 7	Sept. 27	10	83 +
Homopyralis tactus	7	Aug. 26	1	51 +
Gortyna nictitans	17	26	0	41
Hyppa xylinoides	28	Oct. 2	5	67
Orthosia ferrugineoides	Sept. 7	25	0	49 +
Catocala ultronia	July 8	Aug. 25	6	49
Catocala nuptula	17	7	2	22
Catocala parta	24	Sept. 25	12	64
Catocala Briseis	24	20	..	59
Catocala cara	Aug. 18	27	11	41
Catocala neogama	25	30	15	37
Xylina Bethunei	Sept. 4	Oct. 24	7	51
Xylina disposita	9	25	6	47
Xylina petulca	11	21	12	41
Xylina laticinerea	29	25	2	27

A few Microlepidoptera were among the preceding collections at sugar: for most of the determinations, I am under obligations to Prof. C. H. Fernald, of the Maine State College, at Orono.

Tortrix rosaceana *Harr*	July 4.
Exartema permundanum *Clem*	July 21.
Tmetocera ocellana (*Fabr.*) ‡	July 7.
Condylopeza nigrinodis *Zell*	June 23.
Depressaria atrodorsella *Clem*	Sept. 15.
Depressaria pulvipurella *Clem*	Aug. 21.
Depressaria Fernaldella *Chamb*	Sept. 15.

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* The collections were commenced at this date.

† The annexed + indicates that the entire period of duration is not shown.

‡ The Bud-moth (*Grapholitha ocellana*) of the Canadian Entomologist, v. III, p. 13, f. 9.

VI. ON SOME LEPIDOPTERA COMMON TO THE UNITED STATES AND PATAGONIA.

In the *Bulletin de la Société Impériale des Naturalistes de Moscou*, for 1875 (Vol. 49, Pt. 2d, pp. 191–247), an interesting paper is published by Prof. C. Berg, Director of the Museum of Natural History of Buenos Ayres, on "Patagonian Lepidoptera." It is based on collections made by the writer, in Patagonia, during a short visit in the year 1874. The collections were confined to the coast region, extending from the Rio Negro to the Rio Santa Cruz, or between 41 and 50 degrees of south latitude. The insect-fauna was found to be quite limited, as might be expected from the scanty vegetation of the coast. Could the interior country have been explored, it would, no doubt, have yielded much more abundantly.

Previous to this visit, but four or five species of Patagonian Lepidoptera were known. Fifty-six species were collected by Prof. Berg, at this time, of which twenty are described in his paper as new to science. Of these fifty-six species, nineteen were observed only in Patagonia, — the others had also been collected in the countries adjacent. The interesting statement is made that *Agrotis ypsilon*, *Heliothis armiger* and *Asopia farinalis* — species of extensive distribution throughout Europe and America — were apparently confined to those sections of the coast to which cultivation had extended, and, therefore, it was inferred that they had, in all probability, been introduced through commercial intercourse with other countries.

The collections were of the following groups: Of Rhopalocera, 14 species. Of Heterocera—Sphingidæ 3 sp.; Bombycidæ 5 sp.; Noctuidæ 11 sp.; Geometridæ 1 sp.; Pyralidæ 6 sp.; Chilonidæ 1 sp.; Phycidæ 4 sp.; Tortricidæ 1 sp.; Tineidæ 8 sp.; Pterophoridæ 1 sp.

A special interest attaches to the record of the above collection from the occurrence among them, in this remote region of so large a number of species belonging to the United States — no less than seventeen species, or over thirty per cent of the entire number.

As the geographical distribution of our insects is at the present time receiving much attention, this list of Prof. Berg will be welcomed, from the care, apparently, with which he determinations have been made, and the extension of observations to a country of whose Lepidoptera scarcely any thing was previously known.

The species recorded which also occur in the United States are as follows:

Callidryas Eubule *Linn.*
Danais Archippus *Fabr.*
Pyrameis huntera v. Iole *Cram.*
Pyrameis Carye *Hb.*
Pamphila Phylæus *Drury.*
Philampelus labruscæ *Linn.*
Philampelus vitis *Linn.*
Agrotis saucia *Hb.*
Agrotis ypsilon *Rott.*
[1]Leucania extranea *Guen.*
Heliothis armiger *Hb.*
Erebus odora *Linn.*
Asopia farinalis *Linn.*
[2]Ephestia interpunctella *Hb.*
Nomophila hybridalis *Hb.*
[3]Plutella xylostella *Linn.*
[4]Pterophorus leucodactylus *Fabr.*

Collections of the larvæ were also made, and a number of them described: their food-plants and transformations were also observed. A peculiarity of the caterpillars noticed by Prof. Berg presents so wide a departure from normal habits resulting from the modifying influence of surrounding conditions, that we are led to give the following translation, in full, of his statement:

"It still remains for me to note a peculiarity of the caterpillars, viz., their extreme ferocity — their cannibalistic propensities. All of them, irrespective of family or group, manifest the liveliest desire to kill their fellows. While confined they ate only one another, seldom, if ever, touching the food-plants. The caterpillars of the Bombycidæ completely devoured others of the same family, leaving absolutely no fragments of them. They even tore open the cocoons, from which they dragged out the pupæ and ate them — to which fact I called the attention of my traveling companions.

In like manner, the larvæ of the Noctuidæ acted among themselves and toward the Bombycidæ, and the latter toward the former. Among these last, *Heliothis armiger* was gluttonous beyond all measure,— one of them devouring in twenty-four hours, from six to seven others. The caterpillar of

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[1] L. unipuncta *Haw.*

[2] Tinea Zeæ *Fitch.*

[3] P. cruciferarum *Zeller.*

[4] Aciptilia alternaria *Zell.*

Pyrameis Carye was also carnivorous, but to a very moderate extent, preferring at all times fresh plant-food to flesh, while others, as the Noctuidæ, *would not touch the plants after having once tasted flesh.*

This peculiarity of the Patagonian caterpillar is easily explained. During the summer, excessive heat and drought prevail, and these, coupled with dry winds, tend to wither and destroy all vegetation. As the caterpillar is then deprived of its proper nourishment it is compelled by the law of self-preservation to seek elsewhere for food, and so it comes that they eat one another. This habit becomes hereditary, and the descendants frequently practice it, even when there is no lack of vegetable food."

VII. ON LYCÆNA NEGLECTA EDW.

[From the Canadian Entomologist, for May 1, 1875.]

In the very interesting paper of Mr. W. H. Edwards, published in the May number of the Canadian Entomologist, in which another valuable addition is made to the knowledge of our Lepidoptera, by the identity therein shown of the Lycænas *pseudargiolus* and *violacea* — autumnal and vernal forms of the same species — it is suggested that *neglecta* and *Lucia* may prove to bear the same relationship to one another. The possibility of this is inferred by Mr. Edwards from observations made by him, that *Lucia* is an early spring form (April and May in New York), and *neglecta* a later one, "occurring at intervals from June till September."

I cannot believe that *neglecta* and *Lucia* will ever be united as seasonal varieties of the same species. Several years of diligent collecting by Mr. von Meske and myself in this portion of the State, embracing a range of ten miles of territory, have failed to reveal a single example of *Lucia*, nor has it come under our observation in any of the collections made by others in this part of the State. We might, therefore, be almost justified in asserting that it does not occur here. We have it from Long Island collected by Mr. Graef and Mr. Tepper.

On the other hand, in that famous collecting ground, Center, on the "pine-barrens," midway between Albany and Schenectady, upon the line of the N. Y. Central and Hudson River R. R., than which, we believe, the northern United States can produce no superior locality for the Lepidoptera, *neglecta* usually swarms at its proper season. There have been times and seasons when, as we have traversed the roadways leading over the yellow sands of Center and among its pines, that the air about us has seemed blue from the myriads of *neglecta* driven up from the damp sands by our approach. Here, certainly, one might confidently look for *Lucia*, were it but a varietal form.

Our observations and records do not agree with those of Mr. Edwards, giving June as the earliest appearance of *neglecta.* From notes made by me, and from dates of capture appended to examples in my collection, I cite the following :

In the year 1869, on May 21st, *neglecta* occurred in great abundance, all of which noticed, with three exceptions, were males. The worn condition of some of the captures indicated that they had already been abroad for several days. The locality had not been explored since the 11th of May, when the species was not found. About the 9th of June it was observed at its greatest abundance ; it was seen for the last time during this year on the 30th of July. In 1870, it was first observed on the 14th of May (none in a collecting trip on the 6th). The last recorded appearance was on the 16th of June. *L. comyntas* was seen from May 6th to September 14th, continuously. In 1871, *neglecta* is recorded from May 16th to June 16th. In the following year its first record is on May 21st.

The latest date of my capture of this species is August 20th, at Schoharie, N. Y. ; the earliest is at Bath-on-the-Hudson near Albany, on May 14th (the year not stated)

The observations which I have given above, when coupled with those of Mr. Saunders appended to the paper above referred to, of the frequent occurrence of *neglecta* in his neighborhood (London, Ont.,) and non-occurrence of *Lucia*, would seem almost to establish beyond question their non-identity. That these statements may receive all the consideration to which they are entitled, it may be proper to accompany them with the mention made to me by Mr. Scudder, not to be construed to the disparagement of the valued labors of others, that, as the result of an elaborate tabulation of the numerous returns made to him or collated by him, of the Rhopalocerous fauna of the various portions of the United States and Canada the two most thoroughly worked up fields were found to be those of London, Ont., and Albany, N. Y.

As a part of the history of *neglecta*, it may deserve mention that Mr. von Meske reports the species as quite rare this year at Center, where in so many preceding years it has abounded.

[Since the publication of the above *L. Lucia* has made its appearance for the first time at Center. Examples of it were collected by Mr. W. W. Hill, on the 16th of May, 1876, at this locality, where it was also captured on the 13th, 20th and 26th of May (5 specimens). At West Point, N. Y., it was observed in abundance on the 30th of April, when 8 males and 4 females were taken by a collector, and three or four times as many in addition, it is believed, were seen.]

VIII. DESCRIPTIONS OF TWO NEW SPECIES OF CALIFORNIAN BUTTERFLIES.

Lycæna Lotis n. sp.

Male. — Wings glossy violet-blue; margins bordered with black, extending narrowly on the costa to near the base — the black of the costa edged outwardly with white; veins defined by black scales; fringes white with black basilar scales. Palpi black above, white laterally. Thorax and abdomen black with long whitish hairs.

Beneath: wings gray. Primaries: the discal, extradiscal* and submarginal black spots, in appearance and position much as in *Scudderii;* the two rows of the submarginal series are more contiguous than in that species, nearly equally well defined, and without space between them for the fuscous spots usually present (at least in the median portion of the range) in the ♂ *Scudderii*, and always in the ♀. Secondaries: three white-annulated, black extrabasilar spots; the extradiscal doubly-curved series of similar spots, nearly as in *Scudderii;* the black spots of the submarginal series are nearly covered with metallic scales giving a green reflection (*blue in Scudderii*), anterior to which and resting thereon, a connected (on the veins) series of fulvous crescents, tending to a sagittate

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*Reference in this description, to the shape of the spots in this series, is purposely omitted, for the reason that, in this group they are subject to so great variation that it is impossible to draw from them any reliable specific characters — at least from the inspection of a few individuals. In the twenty-eight examples of *Scudderii* before me, the following variations are noticeable: In one, all the spots are round (or nearly so) except the last interior one, which is geminate on the submedian fold: in another, not a single spot is round or even approximating that form: in one, the fifth spot, which, in the original description of the species is said to be "twice as long as the others," is in this, the shortest of all. In four examples, the second and third spots are prolonged inwardly toward the discal spot in a tail-like projection, while in others they are regularly rounded, and again in others, quite extended toward the outer margin. In one example, the first five spots are distinctly semi-oval in form; in others, the spots assume ovate, elliptical, triangular, crescentic and irregular forms. In five examples, there is an additional smaller spot between veins 8 and 9, preceding the one commonly called the first spot. A difference is frequently to be seen between the corresponding spots of the opposite wings form, narrowly edged before with black; at the tips of the veins, a row of subtriangular black spots. Legs, thorax and abdomen clothed with long, white hairs.

Female.— Above uniformly brown, being without the interior violet-blue shade characterizing *Scudderii;* a few (perhaps twenty on each side) purple scales are to be seen beneath the basilar portion of the median of the primaries and at the base of the secondaries. On the primaries, a submarginal crescentiform fulvous band, which is more distinct between the nervules of the median; on the secondaries a submarginal row of six semi-elliptical black spots, preceded by fulvous crescents, and followed by a few pale scales.

Beneath: on the primaries, the extradiscal row of black spots rather weaker than in *Scudderii* (as also on the secondaries), while the outer row of the submarginal series, which, in that species is often obsolescent, is in this, well defined and of nearly equal strength to the interior row. The secondaries show but two of the usual four extrabasilar black spots; the remaining ornamentation much as in the other sex.

Expanse of wings, ♂, 1.30 inch — ♀, 1.25 inch. Length of body, ♂, .5 inch — ♀, .44 inch.

This species differs principally from the allied species with which it is compared, in the black veins and brighter and more glossy wings of the ♂, and the uniform brown wings of the ♀, with its submarginal fulvous band on the primaries; in the stronger submarginal spots of the lower surface, and the weaker interior spots; the more numerous metallic scales and their peculiar hue; the shape of the fulvous crescents and the narrowness of the black lines bordering them; the heavy black termination of the veins, etc.

The secondaries are more prolonged on the submedian nervure, giving to the anal angle a greater prominence.

Hab., etc.—Mendocino, California. Two examples. Collection of W. H. Edwards.

Pamphila Osceola n. sp.

Wings above dark glossy brown as in *P. Metacomet;* outer margin blackish-brown; fringes, dark brown.

Male: primaries with some dull yellowish scales on the inner half of the costa, on the outer side of the discoidal stigma, and within it between the median and submedian nervures. Discoidal stigma velvety-black, consisting of two acutely ellipsoidal spots, which join on the 1st median nervule, and have their other extremities resting on the submedian and 2d median nervule — the inner spot with distinct black scales near the submedian. Beneath brown, blackish over the discoida stigma, with obscure yellow shades exterior to it as the only markings. Abdomen above, unicolorous with the wings, with yellowish scales laterally. Thorax beneath and abdomen contiguons, brown with some longer clay-colored hairs. Palpi clothed with bristling yellow scales, from which the tip of the last joint barely projects.

Female: primaries with dull yellow scales and hairs, more numerous on the inner half of the interior margin, and nearly absent from the outer margin; two yellow spots between the median nervules—the outer one scarcely more than a spot, the inner subquadrangular; no anteapical spots, but in their place some clustering yellow scales. Beneath, dark brown, the primaries reddish-brown basally, and the secondaries of the same shade throughout except toward their inner margin. The two spots of the upper surface of the primaries are reproduced beneath somewhat more obscurely. Thorax and front of head yellowish scaled; palpi with black scales above, and beneath with some clay-colored scales.

Expanse of wings, 1.28 inch; length of body, .62 inch.

The species is allied to *P. Metacomet;* the geminate character of its discoidal stigma is better defined; its fringes are darker; its median spots are yellow instead of whitish; it is without the anteapical spots, and lacks the band of pale spots on the secondaries beneath; the lower side of the abdomen is without the conspicuous mesial line of pale scales of *P. Metacomet.*

Hab., etc.—Mendocino, California. 1 ♂ and 1 ♀ in the collection of W. H. Edwards.

The references of these two species to the *28th Rep. N. Y. State Mus. N. H.*, made on pages 53 and 62 of *Edwards' Catalogue of Diurnal Lepidoptera*, require correction for the reason stated on page 70.

IX. ON SOME SPECIES OF NISONIADES.

Nisoniades Pacuvius n. sp.

Head and palpi thickly clothed with bristling brown and gray hairs, the obtuse tip of the third joint of the palpi only visible; antennæ brown above, the joints bordered with white beneath and within. Thorax and abdomen beneath with long brownish hairs; legs brown with pale hairs at their joints.

Wings approaching those of *N. Persius* in shape, but the primaries somewhat narrower.

Primaries umber-brown, mottled with black as in *Martialis;* near each extremity of the cell, conspicuously marked with a large black spot, the outer one having the hyaline white cellular spot on its outer margin. A row of black spots cross the nervules, upon which are the following white hyaline spots: four costo-apical ones, of which the costal one is scarce more than a dot, the second, the largest and quadrate, the third and fourth quite small, with their longest diameter in the direction of the breadth of the wing; in cells 2 and 3 each, a triangular spot with the apex directed toward the outer margin of the wing — that in cell 2 but partially hyaline; in cell 1 b, two triangular spots (not hyaline), marked with white scales so obscurely in the somewhat imperfect specimen, that possibly they may not prove a constant feature. Some white hairs and scales separate this row of black spots from a subterminal row of rounded black spots, which is again separated by a few similar white scales from the black terminal margin. Fringes umber-brown, their base cut by some white scales projected from the black margin.

Secondaries fuscous, faintly marked by some brown spots and an indistinct subterminal row of brown dots. Fringes snow-white with some brown scales of the terminal margin cutting their base, and at the apical angle of the wing, extending nearly to their outer edge.

Beneath, primaries pale brown, the hyaline spot in cell 3 showing conspicuously, and with white scales covering the extreme apical portion of the wing. Secondaries reddish brown basally and medially, and with a double row of pale brown spots before the outer margin between veins 1 b and 4. Fringes as above.

Expanse of wings 1.38 inch. Length of body, .58 inch.

Habitat.—New Mexico. Described from 1 ♂ in the collection of Mr. W. H. Edwards.

This species may be recognized among all those of the genus known at present, by the white fringes of the secondaries less sharply defined at their base than in *N. tristis*, by its smaller size, less pointed primaries and a less projected anal angle of the secondaries than in that species.

Nisoniades funeralis Scudd.-Burg.

Wings black, approaching *Pholisora Catullus* in shade; in the ♂, a few white scales on the outer half of primaries which cluster in a crescentiform subterminal line; an umber-brown spot resting on the discal cross-vein and another midway on the submedian fold; in the ♀, some white scales occur also on the basal half of the wing, the two umber-brown spots more conspicuous than in the ♂, and, in addition, a line of the same shade associated with the white scales of the subterminal line: in each sex four small (the two inner ones linear) anteapical white spots, and a larger one in cell 3; in the ♀, a discal spot in addition. Cilia brown, with some basilar white scales, more numerous in the ♀. Secondaries of ♂, prolonged at inner angle, nearly unicolorous; of the ♀, showing indistinctly two rows of umber-brown spots before the margin. Cilia snow-white, in the ♂ with black basal scales at and near the apical and inner angles, intermediately contrasting sharply with the black margin of the wing; in the ♀, the cilia longer, with some anteapical black basal scales, but none before the anal angle, where the white scales run over on the inner margin for a short space and then become dusky.

Head, thorax and abdomen above, black; terminal joint of palpi moderately projecting beyond the squarely-cut scales; antennal hook red.

Beneath, wings fuscous, the ♂ with the white discal spot indicated, and with two obscure rows of paler brown spots before the margin; in the ♀ the spots are much more conspicuous, of a much paler shade—the outer row of each wing consisting of whitish intranervular lines cutting the pale spots (the corresponding spots in *N. Brizo* and *N. Icelus* present this character in a degree). Antennal joints narrowly marked with white.

Expanse of wings; 1.75 inch.

Habitat. — Texas and California.

Described from 1 ♂ and 1 ♀ in perfect condition, received from Mr. Heiligbrodt, of Bastrop, Texas, and from 3 ♂'s in inferior condition from the Collection of W. H. Edwards (two from Texas and one from San Diego.)

This species is believed to be the *N. funeralis* of Scudd.-Burg. (*Proc. Bost. Soc. N. H.*, xiii, p. 293. 1870), it having been received from Mr. Edwards under that name. The marked contrast between the snow-white fringes of the secondaries and the black of the wings, in fresh examples, makes this the most beautiful species of the genus.

Nisoniades tristis (Boisd.).

Nearly allied to *N. funeralis*, and may best be separated from it by comparison. It is a little smaller in size; the secondaries of the ♂ are apparently less prolonged at the anal angle; the white spots of the primaries are larger, and the ♂ has also a white cellular spot; the brown basal scales of the cilia of the secondaries are not confined to the angles, but cut the white scales throughout the entire margin although less numerously intermediately. The wings on the under side lack the whitish intranervular lines upon the submarginal spots seen in *N. funeralis*.

Expanse of wings; 1.55 inch.

Habitat. — California. Material under observation, 2 ♂'s and 1 ♀, in imperfect condition.

The diagnosis of this species as given by Dr. Boisduval (*Lépidoptères de la Californie*, p. 22; 1869) is as follows: "*Alæ nigro-fuscæ; anticæ punctulo medio strigaque e punctulis sex similibus transversis albidis; posticæ fimbria alba.*

Elle a le port et la taille de *T. Juvenalis.*"

The description given in Morris' Synopsis, in addition to the above features, represents the line of white points as "separated into two groups — the one of four near the upper edge, the other of two, beyond the median nerve."

The spots "beyond the median nerve" vary in size and in number in the same species, as will readily be seen by an inspection of a number of individuals. In two of the above examples of *N. tristis*, there is a white spot in each of the cells 2 and 3; in the third, in cell 3 only. When but one spot is present, it is always that in cell 3, — the smaller of the two having disappeared. Nor does the number of anteapical white spots afford a specific character, for while the normal number is four, some examples of *N. Martialis* in my collection show but three, and others (more rarely) five.

Nisoniades Afranius n. sp.

Thorax and abdomen above, black; beneath, with brown hairs. Palpi clothed with long brown hairs. Legs fuscous.

Primaries with the costal margin nearly as straight as in *N. Persius*, but rounded toward the apex; moderately bent basally. Outer margin more rounded than in any ♂ Nisoniades known to me (the ♀'s, as a rule, having more rounded wings), as much so as in *N. Brizo* ♀. Inner angle rounded, with internal margin short.

The usual black markings in the basal region of the wing; the remainder clouded with brown, distinctly relieving the transverse line of elongated black spots, and the row of rounded submarginal black spots; a few gray scales are sprinkled over the brown ground. The black spots of the transverse band above vein 2 are more elongated in proportion to their width, more acute toward the outer margin, and more sharply defined than in any other known species — even than in *N. Ausonius*. The line of four small, anteapical, white, hyaline spots is sensibly drawn inward toward the base, so that an imaginary line traversing these spots will cut the outer margin within its apical half. A white hyaline spot rests on the black spot in cell 3, and the three black spots in cells 2 and 1 b, have some gray scales centrally. There is a trace of a small, whitish, hyaline, discal spot. The terminal margin is without the black line seen in *N. Martialis*.

Secondaries, dark umber-brown, with the two rows of pale brown spots, similar to those of *N. Persius* ♀.

Wings beneath, a rich umber-brown, showing on the primaries the discal and anteapical spots more plainly than above, and a white spot each in cells 3 and 2. The two rows of pale brown spots on the secondaries are strongly relieved by the dark ground. The margins of the wings bear a black marginal line, obsolete toward the apex of the primaries.

Expanse of wings, 1.20 inch: length of body, .48 inch.

Habitat.— Colorado.

I venture, from a single example, to designate this as a distinct species, in consideration of the entirely different aspect it presents from the other forms. It is one of the smallest of our species, about equal to *N. Ausonius;* has unusually rounded wings, and is more distinctly marked than any other species, except *N. Martialis*, from which it differs materially in the shape of its wings and its transverse band of spots less inflected at its last fourth toward the outer margin.

I have no opportunity of determining at the present, if the above may not be one of the two species from Colorado, to which Mr. Scudder has given the MS. names of *N. Petronius* and *N. Rutilius*, in Lieut. Wheeler's *Report upon Geographical and Geological Explorations and Surveys West of the One Hundredth Meridian*, 1875, pp. 786, 787.*

Through the kindness of Mr. W. H. Edwards, I have been permitted to examine a number of examples of NISONIADES collected in 1877 by Mr. H. M. Morrison, in Colorado. They were all perfectly fresh, in fine condition for examination, and were as follows:

Nisoniades Icelus Lintn.

Several examples did not differ, apparently, in the slightest particular from New York specimens, except in one small individual, of less than an inch expanse of wings, in which the pale color, indistinct ornamentation, and small size, are, in all probability, the result of imperfect development in the larval stage. One specimen of this species is reported by Mr. Mead, loc. cit., as having been taken in Central Colorado, but in Edwards' *Catalogue of Lepidoptera* (1877), its greatest western distribution is given as Illinois.

Nisoniades Brizo Boisd.-Lec.

The examples of this species in their bright coloring and distinct ornamentation were more beautiful than any which had previously come under my observation. The series of six gray-centered and black-bordered spots crossing the cell parallel to the outer transverse row, which usually forms an interrupted series, in these, blend in a connected band, nearly as conspicuous as the outer row. This species, I believe, has not been previously reported from Colorado.

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*Chapter VIII Report upon the Collections of Diurnal Lepidoptera made in Colorado, Utah, New Mexico and Arizona, during the years 1871-1874. By Theodore L. Mead, pp. 735, 794; plates xxxv-xxxix.

Nisoniades Martialis Scudd.

One of the two examples of this species corresponds with our usual New York forms, and the other, in the more subdued tone of its ornamentation, is similar to the individuals of our second brood, appearing in July and August. It is unfortunate that no dates of capture are appended to these specimens.

Nisoniades Persius Scudd.

The examples which I refer to this species, present some differences as compared with our eastern forms. In Mr. Mead's Report, ut cit., Mr. Scudder is quoted as having noticed some points of difference. Although Mr. Mead represents this species as the most common of its genus in Colorado, I have but three examples before me; and upon so small a number, I am unable to form a decided opinion.

Nisoniades Juvenalis Fabr.

I have, with some hesitation, labeled several examples agreeing among themselves, with this specific name, as I am unable to trace any constant features in which they differ from some of our New York forms. I am, however, of the opinion, that in the collections made in the vicinity of Albany, two species are included in our *N. Juvenalis*. Marked differences are noticeable in size, shape of wings, and markings, which are hardly consistent with a single species. The smaller form is that in which are seen more pointed wings and narrower, less rounded outer margins, and plainer ornamentation. Still, I have not been able to discover any marked features by which a separation can be made. The larger form with broader wings and conspicuous markings is of less frequent occurrence than the other. A large series from Center, N. Y., submitted some years ago to Messrs. Scudder and Burgess for the examination of the genitalia, contained both of these forms, but were all returned to me labeled as *N. Juvenalis*.

It is very desirable that large collections of these forms should be made for study, and that broods of them be reared from captured females imprisoned over their food-plant, upon the plan practised by Mr. Edwards with such signal success, and extremely valuable results.

X. TRANSFORMATIONS OF NISONIADES LUCILIUS LINTN.

The egg measures .03 of an inch in diameter. Its shape was not noted. An example examined was marked with fourteen ribs and twenty-five transverse striæ.

The larva before its second molting measured .30 of an inch in length, and previous to its third molting .55 of an inch. After the molting, its length was .70 of an inch. Its body bears numerous short, white, downy hairs, and is marked with white dots. Its color is yellowish-green, especially on the incisures, with a blue-green vascular line. The legs are tipped with fuscous, particularly the anterior pair; the prolegs are green. The segments show four annulations on the posterior half.

The body of the larva is translucent, allowing the internal organs to be seen. On the eighth segment an oblong yellow spot on each side of the vascular line, as in *Pieris oleracea*, marks the position of some of the viscera, and on the second segment is a similar mesial mark. The pulsations of the dorsal vessel are quite conspicuous. With a magnifier, ramifications of the branchiæ are to be seen, surrounding the stigmata.

After its third molting, the two brown spots on the head of the larva appear, which thenceforth are so marked a feature. At maturity the larva has attained a length of .8 of an inch, with a diameter in its broadest part of .16 of an inch; diameter of head .10 of an inch.

The last molting was on August 3d, and on the 6th the chrysalis was formed.

The chrysalis is cylindro-conical in form, not angulated; thorax slightly elevated; head-case rounded in front, depressed below a line drawn from the anal spine across the bases of the wings to the humeral tubercle — this tubercle dark brown in color, cylindrical, truncated at the apex, and located a little before the base of the anterior wings. The stigmata are white.

At this stage the transparency of the chrysalis permits the rapid pulsations within to be clearly seen. The nervulation of the anterior wings is perfectly visible, and that of the posterior pair, indistinctly.

Five days after pupation (August 11th), the following changes were noticed. The eye-cases had become purple; the wing-cases were whitish, perfectly relieving the nervulation; the abdomen green except at its tip where it was brown. The antennæ folded over the eyes, cutting off a small section of their upper portion, have the club brown, and showing the joints; the posterior leg-cases show numerous brown spinules on the inclosed legs.

On August 12th, a few hours before the escape of the butterfly, the chrysalis was brown, except at the abdominal incisures, where it was green and of a transparency disclosing some of the internal organs. The white annulations of the antennal joints were visible, and through the wing-cases could be seen the gray scales of the margin, the disk and the cilia of the wings. The butterfly emerged in the afternoon of the 12th.

From two other larvæ which had been reared on *Aquilegia canadensis** and changed to chrysalis on the 8th and 9th of August, butterflies were obtained on the 15th, giving for the length of pupation of the three examples, six, seven and six days respectively.

The following captures in the field of *N. Lucilius* were made during the year (1870) when the above notes were taken: May 16th, at Bethlehem, Albany county, 3 ♂'s; May 21st and 31st, one ♂ each, at Center; July 6th, 9 ♂'s at Bethlehem, and another at same locality on the 28th; and others again on August 26th, and September 9th and 14th at the same place.

On August 25th and 28th, five butterflies were obtained from larvæ which had been collected at Bethlehem. So late as September 9th, larvæ just emerged from the egg were taken, associated with others about half-grown.

There are two annual broods of this butterfly, and possibly a third.

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* See Twenty-fourth Report on the N. Y. State Museum of Nat. Hist., p. 164.

XI. DESCRIPTION OF EUDAMUS EPIGENA BUTL.

Eudamus Epigena BUTLER. Lepidop. Exot., p. 65, pl. 25, f. 6. 1871.
Thymele " " KIRBY. Syn. Cat. Diurn. Lep., p. 655. 1871.
Eudamus " " EDWARDS. Cat. Diurn. Lep. N. A., p. 58. 1877.
Eudamus Orestes LINTNER MS.: non 28th Rep. N. Y. St. Mus. N. H.

Thorax, abdomen and wings dark brown, nearly unicolored, but rather deeper toward the terminal margin.

Primaries: costa moderately curved, outer margin nearly straight; in general shape in the ♂ resembling *E. Bathyllus* of same sex, but in the female with its prolonged secondaries, approaching *E. Tityrus* ♂. Cilia, fuscous on primaries merging into white toward the inner angle; on secondaries, white with black basilar scales opposite the veins, until to the angle on the internal vein, thence black. Eight transparent white spots on each wing, viz.: three small disconnected anteapical ones; one triangular cellular spot; a small one in cell 1a, touching vein 2; a larger double-concave one reaching from vein 2 to vein 3; a subtriangular one extending from vein 3 to vein 4; a minute one just above vein 4, equidistant from the margin with that in cell 1a.

Beneath: primaries black costally and above the 1st median nervule (vein 2) outwardly to the white spots — remainder, brown; spots same as above, margined with black. Secondaries, with the bands much as in *Lycidas*, except that they do not contrast so strongly with the ground, producing less of a mottled effect; the outer fourth (third in *Lycidas*) bordered with white (except at anal angle), traversed by numerous short, wavy, brown lines.

Expanse of wings: male, 2 inches, female 2.15 inches.

Habitat.—Texas.

From a pair in the collection of Mr. Otto von Meske, received from Mr. Heiligbrodt, of Bastrop, Texas, to whose faithful labors science is indebted for the discovery of a number of new and peculiarly interesting species of Lepidoptera.

The above species is of special interest from its uniting the principal features of *Bathyllus* and *Pylades*, and the consequent argument which it furnishes against the adoption of proposed genera, resting on microscopic detection of some slight variation in form or proportion.

In the belief that the insect was new to science, it was described by me as *Eudamus Orestes*, for publication in the 28*th N. Y. St. Mus. Report*, then passing through the press; but in the necessitated printing of the Report at an earlier day than was anticipated, the description could not (together with other papers in readiness) be given place. Hence, the erroneous reference made to *Orestes* on page 58 of Edwards' *Catalogue of the Diurnal Lepidoptera of North America*.

Subsequently, Mr. W. H. Edwards identified the species with a figure of Butler in his *Lepidoptera Exotica*. As the figure is accompanied by only a brief diagnosis, and but a few copies of the work are to be found in this country, it is thought that the above description may be of service.

XII. A SYSTEMATIC ARRANGEMENT OF THE EUROPEAN AND SOME AMERICAN HESPERIDÆ.

During the preparation of the Edwards' *Catalogue of the Diurnal Lepidoptera of North America*, the aid of Dr. Speyer, of Rhoden, Prussia, was solicited in the rearrangement of the difficult group of Hesperidæ. The revision kindly undertaken by him embraced only those of the North American species — forty in number — which were represented in his cabinet, together with the European species, of which twenty-three are enumerated. These latter could not conveniently be given in the pages of the catalogue, but as it is the first satisfactory arrangement of the European forms — the more valuable to us from its incorporation with our more numerous species — the present opportunity is taken to present the arrangement in full as furnished by Dr. Speyer.

It is proper to state that the free use which was made in the catalogue of the MS. of Dr. Speyer, especially in the publication of the generic definitions, was not in accordance with his intention, and has called from him an expression of regret. We hope that this further use of the MS. may prove less objectionable.

A. ASTYCI Scudd.

1. **Carterocephalus** Led.
    Palæmon *Pall.*
        =*paniscus* Fabr.
2. **Cyclopides** Hübn.
    Silvius *Knoch.*
    Morpheus *Pall.*
        =*Steropes* W.-V.
3. **Ancyloxypha** Feld.
    Numitor *Fabr.*
4. **Copaeodes** n. g.
    Waco *Edw.*
    minima *Edw.*
5. **Thymelicus** Hübn.
    Thaumas *Hufn.*
    lineola *Ochs.*
    Actæon. *Rott*
6. **Pamphila** Fabr.
    a Massasoit *Scudd.*
        Zabulou *Bd. Lec.*
        Hobomok Harr.
    b **Sylvanus** *Esp.*
        comma *Linn.*
    Sassacus *Harr.*
    Metea *Scudd.*
    Leonardus *Harr.*
    Huron *Edw.*
    Phylæus *Drury.*
    Breltus *Bd.-Lec.*

conspicua *Edw.*
Ætna *Boisd.*
Peckius *Kirby.*
Mystic *Edw.*
Manataaqua *Scudd.*
Cernes *Bd.-Lec.*
  =*Ahaton* Harr.
Metacomet *Harr.*
bimacula *Gr.-Rob.*
Vitellius *Sm.-Abb.*
  =*Iowa* Scudd.
Osyka *Edw.*
verna *Edw.*
Hianna *Scudd.*
7. **Amblyscirtes** Scudd.
vialis *Edw.*

B. HESPERIDES Scudd.

8. **Pyrgus** Hübn.
a Lavateræ *Esp.*
  alceæ *Esp.*
  =*malvarum* O.
  althææ *Hübn.*
  Proto *Esp.*
b Sao *Hübn.*
  =*Sertorius* O.
  orbifer *Hübn.*
c malvæ *Linn.*
  =*alveolus* Hübn.
  alveus *Hübn.*
  serratulæ *Ramb.*
  cacaliæ *Ramb.*
  andromedæ *Wall.*
  centaureæ *Ramb.*
  carthami *Hübn.*
  sidæ *Esp.*
d tessellata *Scudd.*
9. **Nisoniades** Hübn.
Tages *Linn.*
Persius *Scudd.*
Lucilius *Lintn.*
Icelus *Lintn.*
Brizo *Bd.-Lec.*
Martialis *Scudd.*
Juvenalis *Sm.-Abb.*
tristis *Boisd.*
10. **Pholisora** Scudd.
Catullus *Fabr.*
Hayhurstii *Edw.*
11. **Eudamus** Swains.
a Pylades *Scudd.*
  Bathyllus *Sm.-Abb.*
  Lycidas *Sm.-Abb.*
  Cellus *Boisd.*
b Tityrus *Fabr.*
c Proteus *Linn.*

Since the above was in type, a copy has been received of a paper on the Hesperidæ of the European Fauna (*Die Hesperiden-Gattungen des europäischen Faunengebiets*), by Dr. A. Speyer. The author was not satisfied with the arrangement above presented, which had been drawn up at the request of some of his American friends, and which, from the limited time that he was able to devote to it, and the partial examination of species upon which it was based, was contributed only for private use — not for publication. Since then, he has undertaken a more thorough study of the species pertaining to the European Fauna, and the result, published in the *Stettiner Entomologische Zeitung* for 1877, pp. 167–193, is the exceedingly valuable contribution to the knowledge of this interesting group, which is cited above.

At the present time, as these pages are passing through the press, there is only the opportunity of presenting, in justice to Dr. Speyer, in company with his provisional arrangement, the following carefully prepared one recently given to the public. It embraces not only the Hesperidæ of Europe proper, but all those occurring within the European Faunal Division, which includes some of the northern and eastern portions of Asia, as defined in the author's "*Geographischen Verbreitung der Schmetterlinge.*" The Asiatic species are indicated by an asterisk. Forty-one species are recorded in the list, of which twenty-nine belong to Europe. The following is the list, which, in consideration of its careful arrangement, we transcribe literally:

HESPERIDES Latr.

1. **Cyclopides** H. (p.)

1. Morpheus (Pap. m.) Pall. = Steropes WV.
*2. Ornatus Brem.

2. **Carterocephalus** Led.

1. Palaemon (Pap. p.) Pall. = Paniscus F.
2. Silvius (Pap. s.) Knoch.
*3. Argyrostigma (Steropes a.) Ev.

3. **Thymelicus** H. (p.)

1. Lineola (Pap. l.) O.
2. Thaumas (Pap. th.) Hufn. = Linea WV.
*3. Hyrax (Hesp. h.) Led.
4. Actaeon (Pap. acteon) Rott.

4. **Pamphila** F. (p.)

A.
1. Comma (Pap. c.) L.
2. Sylvanus (Pap. s.) Esp.
*3. Ochracea Brem.
(Ætna Bdv. spec. americana ?)
B. (Goniloba HS.).
*4. Alcides (Hesp. a.) HS.
C. (Goniloba HS.).
*5. Mathias (Hesp. m.) Fabr. = Thrax Led., non Lin.
*6. Zelleri (Hesp. z.) Led.
7. Nostrodamus (Hesp. n.) F. = Pumilio O.
D.
*8. Inachus (Pyrgus i.) Mén.

5. **Catodaulis** n. gen.

*1. Tethys (Pyrgus t.) Mén.

6. **Pyrgus** H. (p.)

A. a. (Carcharodus H., Spilothyrus Bdv.).

1. Lavaterae (Pap. lavatherae) Esp.
2. Althaeae (Pap. altheae) H.
    Var. b. Baeticus (Spil. b.) Ramb. =Floccifera Zell.
3. Alceae (Pap. a.) Esp. = Malvarum O.
4. Proto (Pap. p.) Esp.
5. Tessellum (Pap. t) H.
    *Var. b. Nomas (Hesp. n.) Led.
6. Cribrellum (Hesp. c.) Ev.

B. a.

*7. Poggei (Hesp. p.) Led.

B. b.

8. Phlomidis (Hesp. phl.) HS.
9. Sao (Pap. s.) H. = Sertorius O.
10. Orbifer (Pap. o.) H.

7. **Scelothrix** Ramb.

*1. Maculata (Syricht. maculatus) Brem. et Grey.
2. Sidae (Pap. s.) Esp.
3. Cynarae (Hesp. c.) Ramb.
4. Carthami (Pap. c.) H.
5. Alveus (Pap. a.) H.
    Var. b. Fritillum (Pap. fr.) H.
    Var c. ? Cirsii (Hesp. c.) Ramb.
    Var d. ? Carlinae (Hesp. c.) Ramb.
6. Serratulæ (Hesp. s.) Ramb. HS. An praeced. var. ?
    Var. b. Caeca (Hesp. caecus) Fr.
7. Cacaliae (Hesp. c.) Ramb. HS.
8. Andromedae (Syrichth. a.) Wallengr.
9. Centaureae (Hesp. c.) Ramb.
10. Malvae (Pap. m.) L. = Alveolus H.
    Ab. Taras (Hesp. t.) Meig.
    *Var.b. Melotis (Hesp. m.) Dup. =Hypoleucos Led.

8. **Nisoniades** H. (p.)

*1. Montanus (Pyrgus m.) Brem.
2. Tages (Pap. t.) L.

9. **Thanaos** Bdv. (p.)

1. Marloyi Bdv. = Sericea Fr.

The List is followed by a Diagnostic Table of the Genera, after which, twelve pages are devoted to descriptions of, and remarks upon, the several genera.

A translation of the entire paper of 27 pages is contemplated, that American students of Lepidoptera may have the benefit of the highly valuable observations and criticisms which it contains.

XIII. NOTES ON NOTODONTA DICTÆA LINN.

? *Phalæna tremula* CLERCK. Icon. pl. ix, f. 13. 1759.
? *Phalæna Bombyx tremula* LINN. Faun. Suec., Ed. ii, p. 298, no. 1121. 1761.
? " " " LINN. Syst. Nat., Ed. xii, p. 826, no. 58. 1767.
" " *dictæa* LINN. Syst. Nat., Ed. xii, p. 826, no. 60. 1767.
Leiocampa dictæa STEPHENS. Ill. Brit. Ent., Haust. ii, p. 25. 1829.
Pheosia rimosa PACKARD; in Proc. Ent. Soc. Phil., iii, p. 358. 1864.
Notodonta Californica STRETCH. Zygænidæ-Bombycidæ N. A., i., pp. 116, 240, pl. 4, f. 5; pl. 10, f. 9, 1872–73.
Notodonta tremula STAUD. Cat. Lep. Eur. Faun., Ed. ii, p. 72, no. 975. 1871.—p. 72. 1877.

A larva of the above species was taken at Bath-on-the-Hudson, Sept. 9, 1869, on willow. It molted during the night, and on the following day it measured, when at rest, .95 of an inch. The following were its features: Head light yellow-green, subquadrangular, with an impressed median line; mandibles yellow, tipped with black. Body white dorsally, with a bright yellow stigmatal stripe bordered above with green. Caudal horn conical, white, tipped with glossy black and with a black stripe laterally. Caudal shield granulated, broadly elliptical in outline — its largest diameter transverse to the body. Stigmata broadly oval, velvety-black on a white ground. Legs ferruginous, with a black spot above them: prolegs with a glossy black spot laterally, and a dull black larger one above them, extending upward to the stigmatal line.

The larva was of remarkable transparency, exceeding that of any other which had come under my observation. The lateral and ventral regions had almost the transparency of glass.

It matured on the 19th, when it measured 1.1 inch long and .17 inch broad. It was not suspected at this time of having reached maturity, but was thought to be a young Sphinx, with probably one or two additional moltings to undergo before its pupation. The diminished activity shown by it, and its refusal of food, was ascribed to its change to poplar soon after its capture. On the 21st, at the suggestion of a friend that it had possibly matured, it was placed on some ground, when, much to my surprise, notwithstanding its weak condition, it speedily buried itself beneath the surface for pupation.

The moth was not obtained from it.

On Sept. 14, 1869, a second larva was found at Bethlehem, Albany county, feeding on the aspen (*Populus tremuloides*), in an earlier stage of its growth, and just after a molting, judging from the comparative size of its head, which was twice the breadth of its body. Its length was .56 inch, and diameter .05 inch.

It was fed on aspen leaves, and on the 19th it again molted. The following day it resumed its feeding, and the day thereafter its dimensions were, length —, diameter .08 inch, diameter of head .12 inch. It was of a yellow-brown color dorsally, with transverse slate colored markings centrally on the segments. (No further record of the larva: it probably died before its maturity).

On Sept. 5, 1872, another larva, 1.65 inch long, was taken on poplar. Body greenish-white dorsally, shading on the side into green; substigmatal stripe bright yellow, interrupted below the stigmata by the extension of the oval white spot encircling the stigma. Caudal horn black. Caudal shield broadly crescentic, granulated, with a glassy tubercle centrally and margined with brownish-red. Legs and prolegs having the portions of the body above them of a violet color — the prolegs with an acutely elliptical ferruginous spot upon them outwardly, crossed on their anterior part by a quadrilateral black spot.

Sept. 14, 187–, larva feeding on *Populus tremuloides*, at Bethlehem. Length at rest, 1.3 inch; diameter .18 inch; the head and first pair of legs extended in line with the body. Head of the diameter of the thoracic segments, subquadrangular, deeply impressed medially, smooth, of a bluish-gray color, showing reticulations under a magnifier; mandibles and a crescentiform spot bearing the eyes dull yellow. Body with a marked degree of transparency in its lower portion, shining, without the usual annulations of the segments, nearly cylindrical to the tenth segment, the eleventh broad, elevated in a prominent cone; the thoracic segments contracted when at rest, forming each three distinct wrinkles, making these segments broader than the succeeding ones; incisures deep; color bluish-gray, a yellow ventral line, and a bright yellow substigmatal one indicated by obscure yellowish markings at the incisures; a dark, bluish-gray transverse line on the side of each segment — the same shade surrounding the stigma and extending to the proleg; on the eleventh segment a blackish transverse line running behind the stigma upon the caudal horn — the latter .09 inch long, glossy black. Caudal shield ferruginous, rugose, elevated marginally and in a small tubercle centrally, in outline a broad ellipse having a lenticular portion excised from its upper fourth; anal plates subtriangular, and of a similar color and surface. Stigmata depressed, elliptical, surrounded (except the first) with a well defined white ring which is more broadly elliptical than the stigma.

Entered the ground for its pupation on Sept. 16th.

The larvæ briefly described by me in the *Proceedings of the Entomological Society of Philadelphia*, vol. III, p. 670, were in all probability this same species. Their color is given as bluish-slate, of about the shade of the branches of the poplar, on which they were feeding (*Populus nigra*). The body is described as gradually increasing in size to the tenth segment; the eleventh segment elevated in a hump, bearing the black caudal horn, one-tenth of an inch long; the stigmata broadly oval, black, white annulated. It is probably identical with the form occurring in Europe, and mentioned as a variety of the *dictæa* larva.

All my efforts to obtain the imago from the above larvæ, have resulted in failure. Examples of the larvæ collected by Mr. von Meske, have also failed to give the imago; after having safely reached the pupal state, they have uniformly died while in that stage. A figure of the larva, taken from a drawing made by me, is given in Glover's Plates of Lepidoptera, XCIX, fig. 16.

No examples of the pupæ, unfortunately, have been retained, and I am only able to recall their smooth and shining surface, and the tapering form of their abdominal segments tipped with a rather long, bifid anal spine.

Mr. Græf, of Brooklyn, has succeeded in rearing the moth from larvæ collected by him, and to him I owe the privilege of being able at the present to refer descriptions made by me several years ago of larvæ which have meanwhile proved an enigma to me, to the imago which they produce, which is apparently identical with the *Notodonta dictæa* of Europe.

I regret that I have not at hand a detailed description of the European larva, to compare with our own. Stephens (*Illustrations of British Entomology, Haust. II., p.* 25), says of it: "Larva naked, with a small conical protruberance on the anal segment; reddish-brown, green on the sides and glossed with violet above, with a black dorsal streak: it feeds on poplar, willow and birch, and is found in July and September."

Newman, in his *History of British Moths*, page 228, gives the following description: "The caterpillar has rather a large head, which is very slightly notched on the crown and shining, and is of a pale green color. The body is almost uniformly cylindrical until the twelfth segment, which is humped, and the hump terminating in a moderately sharp point; the color of the body is whitish or glaucous-green on the back, with a broad paler green stripe on each side — and adjoining this there is a narrow raised yellow-green stripe, just below the spiracles, and touching all of them except that on the twelfth segment; it extends the entire length of the caterpillar, terminating in the anal claspers; on the summit of the twelfth or hump segment, is a black transverse line. It feeds on the sallow (*Populus nigra*), etc. There is a common variety of this caterpillar which is plain brown, without the slightest appearance of the lateral stripe; this occurs after the last change of skin."

Dr. Speyer writes of the larva of the European *N. dictæa*: It has a tubercle of pyramidal shape on the 11th segment, which is much more pointed in the younger stages of the larva, so as closely to resemble the horn of a Sphinx. The mature larva has a strong porcelain lustre, and occurs in two varieties: one is of a green color with a yellow stripe on its sides, and the other is brown without the stripe. It lives on poplar.

Several examples of the American *N. dictæa* were sent by Mr. von Meske to Dr. Speyer to compare with the European forms. Having made the comparison, he does not doubt that they are identical, although the following differences are noticeable. "The American form has a bent white cross-line on the inner part of the brown portion of the anal angle of the secondaries, which is not found in the European. In the former the interior branch of the median nervure [vein 2] has the white streak with which it is marked, shorter and narrower than in the European, and entirely wanting from the middle branch [vein 3]. These are the only differences observable, and they are too slight to afford grounds for their separation."

In addition to the two examples in my own collection, I am indebted to the kindness of Mr. von Meske for the opportunity of comparing two examples of *N. dictæa* from Germany, and two from Racine, Wis.

In the European, the white stripe which traverses the brown anal patch very near the margin, commences in cell 1, within the internal vein, and is continued until near or just beyond vein 2. In the American, this line is not so distinct, and in an ex-larva example, from Albany, it is obsolete, being represented only by a few white scales; in another example, it commences on the fold and continues to vein 3.

The bent white cross-line pointed out by Dr. Speyer as characterizing the American form, is not equally well marked in all. In the Racine specimens, the line commences on the internal margin, runs for a short distance parallel with the general direction of the outer margin of the wing (not of the anal angle portion), and curves inward toward, and is lost in, the submedian fold. An exserted portion of the brown patch lies inside of this white line on the submedian vein (1 *b*). In the Albany example, the line is less conspicuous, and the brown portion inside of it is barely indicated.

The American examples, besides having the brown patch larger, have also the brown border of the secondaries heavier than the European, and continued to the apex.

The comparison of Dr. Speyer of the length of the white lines on the veins of the primaries is not sustained by the examination of other examples, as they vary in length and distinctness. In one before me, the white lines are of the same length on veins 2 and 3 — in another, shorter on 3. The more conspicuous bifurcating white line on the submedian fold, also varies in length. All the above lines also vary in their breadth; those on veins 2 and 3 being nearly as heavy as in the European, while in the Albany example, they are much more delicate.

In the other markings of the wings I find no differences of sufficient constancy to aid in the separation of the forms of the two continents.

So far as we are able to judge from the descriptions at hand, the larval forms also agree; and it is quite an interesting fact that the European variety which is destitute of the yellow lateral stripe, has also its counterpart in the example found at Schoharie, of which the description has been given, and in another taken at Sharon Springs by Mr. von Meske.

From an example of our eastern form sent by me to Mr. Stretch, of San Francisco, he has identified it as his *N. Californica.* If, however, the sketch of the larva made by Dr. Behr and the information which he gives of the larva, be correct, then there is a possibility that a comparison of additional examples of "*N. Californica*" may show it to be distinct. The figure of the larva, as reproduced by Mr. Stretch, is certainly quite different in its appearance from any of those which have come under my observation.

It will be seen that I have included in the synonymy of this species, references to the *Ph. Bomb. tremula* of Linnæus and Clerck, as probably identical with it. This opinion is held by several of the best European Lepidopterists, who claim that the same species was twice described by Linnæus. Others, as Staudinger, entertain the belief that the *dictæa* of Linnæus is a distinct species,—the one ordinarily occurring in Europe being the *N. tremula*, to which the name of *dictæa* has been improperly applied. Standinger, in his citation of *N. tremula* in his catalogue, includes as a synonym "*Dictæa* (L. S. N. xii, 826, ex Barbaria, alia species esse videtur)," adding the references to the following authors who give *tremula* under the name of *dictæa:* "Esper, 58, 5; 84, 2; Hübner Beitr., 22; Ochsenh., iii, 63; Godart, iv, 19, 1; Freyer, 579."

For the present I think it proper to retain the familiar name of *dictæa* for the species, as the necessity for the proposed change does not appear to be clearly shown.

XIV. ON SOME NEW SPECIES OF CERURA.

Cerura occidentalis n. sp.

Head white. Palpi white, blackish laterally. Antennæ white with black pectinations.

Collar pale cinereous, traversed by a darker band and edged behind by a black band. Tegulæ pale cinereous, darker posteriorly; the narrow black band crossing their front, followed by a patch of orange scales, and a few black scales on their inner side. Thorax marked with black and orange bands of raised scales (apparently three orange bands).*

Abdomen above cinereous, the segments bordered behind with pale cinereous; beneath whitish: sides tufted with a lateral row of small black spots.

Primaries whitish basally, sprinkled with some black hairs; medially and terminally pale cinereous with more numerous black hairs. A black basal dot on the subcostal; an extra-basilar row of five black spots on the nervures, usually, in the males, in a straight line (5 examples), but sometimes the two superior are nearer the base (2 examples)†; in the ♀'s (5 examples) the two superior spots are considerably drawn in toward the base, the line presenting quite a curve costally. The median band of black and a few orange scales, paler than in *borealis* and *aquilonaris*, broadest on the costa, elsewhere of nearly uniform width; its black borders subparallel; the inner border more distinctly marked; its general course in the male, direct or slightly excavating the band below the median, while in the female it is conspicuously bent, on or below the same nervure; the outer border usually not well defined below the submedian fold. Behind the median band, a black transverse line, interrupted on the cell and indistinct over the submedian fold. On the discal cross-vein, an elongated black spot. Beyond this, two or three subparallel crescentiform black lines (the inner of the three sometimes obsolete), preceding the abbreviated blackish subterminal band — the band usually terminating at the second median nervule (vein 3). The nine marginal intra nervular black spots smaller than in *borealis*, but larger than in *aquilonaris*.

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*A cabinet specimen of this species is rarely seen, in which the thoracic scales have not been so affected by greasing, that the bands can with difficulty be traced

†In five examples of the European *bifida*, this line curves outwardly at the costal or on the inner margin; in one example (female) it is straight.

Secondaries white, with traces of the inner margin of an outer border, mainly seen on the nervules and at the anal angle, and sometimes with indications of a mesial band behind the obscure discal spot.

Beneath: primaries as above, but less distinctly marked; secondaries with a large discal spot.

Described from 7 ♂'s and 6 ♀'s from the Collections of the Buffalo Society of Natural Sciences, Messrs. von Meske, Hill, Riemann, Tepper, Strecker, Kuetsing and Lintner.

Habitat. — From New York, Pennsylvania, Wisconsin and Canada (Montreal). It will probably be found to extend throughout most of the eastern portion of the United States. It has not, to my knowledge, been observed west of the Mississippi.

The above insect may be found in nearly all the principal collections of the country, under the name of *Cerura borealis*, it being the one which was described by Dr. Harris in his *Report on the Insects of Massachusetts*, 1841, p. 306, and referred by him to the *borealis* of Dr. Boisduval. The description is as follows:

> "The ground-color of our moth is dirty white; the fore-wings are crossed by two broad, blackish bands, the outer one of which is traversed and interrupted by an irregular, wavy, whitish line; the hinder margins of all the wings are dotted with black, and there are several black dots at the base and one near the middle of the fore-wings; the top of the thorax is blackish, and the collar is edged with black. In some individuals the dusky bands of the fore-wings are edged or dotted with tawny yellow; in others [*Cerura cinerea*] these wings are dusky, and the bands are indistinct. They expand from one inch and three-eighths to one inch and three-quarters."

The extrabasilar straight row of five spots readily distinguishes this species from *borealis* and *cinerea* (but not from *aquilonaris*) and ally it with *furcula* and *bifida* of Europe. It is usually of a smaller size than our other species.

Cerura borealis (Boisd)

This is quite a different insect from the preceding, and need not be mistaken for it, or any other species. It is figured in *Cuvier's Animal Kingdom*, London, 1836, vol. IV, pl. 98, fig. 5, as *Dicranura borealis* Bdv. The figure leaves no doubt of the species intended. On the right wing of the illustration, the five inferior nervular spots (see description below) are faithfully depicted in proper position on the median nervules (the two superior ones not shown). On the left wing the two inner sinuses and the three outer of the mesial band are correctly represented in form, size and position. The absence of the two costal black spots between the bands, and of some of the extrabasilar ones, would indicate some imperfection in the example figured. It is also well figured in Smith and Abbot's *Lepidopterous Insects of Georgia*, London, 1797, p. 141, pl. 71, as *Phalæna furcula* — believed by Smith to be identical with the *furcula* of Europe; but to this insect it bears no greater resemblance than to *C. occidentalis*.

It is characterized by its white head and collar, thorax in front marked with a conspicuous transverse black line, abdominal segments broadly banded with fuscous dorsally. Primaries of a snow white ground color, a basilar black dot, followed by four other nervular ones, forming an angular line; a broad, centrally constricted, well-defined, mesial band, of about the same width on the two margins; between this and the subterminal band are two distinct costal spots, and below these on the nervules, seven black spots arranged in an oval, as follows: the two inferior ones on the first median nervule (vein 2), the two medial spots of the exterior four, at about the inner third of the second and third median nervules — veins 3 and 4; of the two medial spots of the interior ones, the lower is at or just before the bifurcation of veins 3 and 4, and the upper is on the discal cross-vein; the superior spot of the oval is on vein 5, equidistant from the two superior medial spots below it. The subterminal line is distinctly marked, and followed by the subterminal band, reduced to a line as it crosses veins 3 and 4, but again expanding on the inner margin.

Secondaries with a well marked discal spot, and with a broad marginal band; the latter in some examples is obsolete.

Expanse of wings: from 1.50 to 1.70 inch.

Habitat. — New York, Pennsylvania, Virginia, Georgia, Missouri (Aug. 26, at light, Riley).

From 3 ♂'s and 6 ♀'s, in the Collections of Messrs. von Meske, Tepper, Riley, Strecker and Lintner.

The seven black spots on the white ground intermediate to the bands, arranged in an ellipse as above described, readily distinguish this species from any other of the genus.

It is closely allied to the *C. bicuspis* of Europe. Mr. A. G. Butler, of the British Museum, to whom I communicated an excellent photograph of it, writes: "it precisely agrees with some of our European examples of *bicuspis*." Dr. Speyer who has received an example from Mr. von Meske, remarks of it: "it is very near to *bicuspis*."

Although quite dissimilar in color from *C. cinerea* Walker, yet it is closely related to that species in the form of the bands (often imperfectly defined in *cinerea*) and in the arrangement of the intermediate nervular spots.

The moth has been reared from larvæ found by Mr. F. Tepper of Flatbush, L. I., feeding on wild cherry, when near their maturity. I am indebted to him for the following note in regard to them. "They are of the same shape as *borealis* [*occidentalis*] but differently colored. Instead of the green of that species, the color is greenish-yellow, the dorsal patch is rather smaller and of a brighter shade, and the minute spots on the sides are more delicate and brighter. The examples met with have been larger than *borealis* and somewhat heavier in appearance. Three mature larvæ were taken by me between the 10th and 15th of July, 1875; one was ichneumonized; the other two spun up in the same manner as *borealis*, within a few days after their capture, and the moths emerged in from two to three weeks."

In Smith and Abbot's *Insects of Georgia* it is said of it: "The caterpillar was taken the latter end of July, feeding on that kind of poplar vulgarly called the cotton-tree. When disturbed, it shoots out of the ends of its forked tail two soft orange-colored threads. Early in August it shed its skin, and on the 10th of that month it inclosed itself in a case made of chips of wood and affixed to a branch. The moth came out April 24th. It likewise feeds on the wild cherry and willow, and is found also in Virginia, but it is a very rare species."

Cerura aquilonaris n. sp.

Head, collar and tegulæ white, the latter crossed anteriorly by a row of glossy purple-black scales; the collar bordered behind by a similar row. Thorax with elevated purple-black and orange scales, which are probably, when in perfect condition, arranged in transverse rows. Abdomen above black, with white borders to the segments, which increase in width as they recede from the thorax; a lateral row of black spots; beneath white.

Wings white as in *borealis*. Primaries with a black basilar spot on the subcostal; beyond, four black spots in a straight line, of which the superior one, under a magnifier, is shown to be triple and the remaining three, in perfect examples, double. Median band consisting of black, orange and pale ash scales and prominently bordered with shining purplish-black scales. The band, in the female, is twice as broad on the costa as on the internal margin, and in the male but one-fourth broader costally; twice equally constricted between the median and submedian; its inner border projected on the subcostal, median and submedian nervures, and slightly on the median fold, on either side of which the excavations are deeper than elsewhere, making the general course of the line a little indirect; the outer border projected on the median, median fold and submedian. Subterminal band less sharply excavated on vein 7 than in *C. occidentalis*; inner border less enlarged at internal angle than in *C. borealis*; outwardly with a black dash before the apex on veins 6, 7, 8 and 9 (the last, costal). Of the usual three lines crossing the wing between the median and subterminal bands, the anterior one is broken and the other two faintly continuous. The terminal intranervular spots are smaller than in *cinerea*, *occidentalis*, *borealis* or *multiscripta*.

Secondaries, without a border, but with traces of an obsolete outer margin near the apex and more distinctly at the inner angle; a few black scales on the discal cross-vein.

Beneath, the primaries have a distinct discal spot and are marked on the costa with black spots at the points where the lines of the opposite side commence, which lines are seen in transparency.

Expanse of wings: ♂ and ♀, 1.60 in.

Habitat. — Canada, Montreal.

From two examples in the Collections of Mr. C. W. Pearson and Mr. F. B. Caulfield, of Montreal, captured in that city. It is probably quite a rare species.

This species, which bears a general resemblance to *C. borealis*, may be distinguished from all others known to me by the black marking of the veins sub-apically. The conspicuous black bands of the abdomen above, in one example (the ♀, the ♂ being without its abdomen) may also prove to be a good distinctive feature.

Cerura candida n. sp.

Antennæ white, with black pectinations of considerable length in the ♀. Palpi porrected, white, outwardly with black hairs. Front, patagiæ, thorax and collar white — the latter with a single fuscous band. Abdomen white, the segments on their anterior border with a few dusky hairs; beneath white; anal region, pale brown. Legs white, banded with black; tarsi black, banded with white.

Primaries, silvery white, with four interrupted black bands before the discal spot — the discal spot forming a small oval ringlet — followed by three interrupted black bands, and a fourth heavier one at the apical and anal region; the usual line of eight intranervular marginal blacks spots, extending on the fringe, less conspicuously marked than in *C. multiscripta*.

Secondaries wholly white, without marginal spots, showing faintly, by transparency, the discal dot of the under surface.

Beneath, primaries with the outer lines of the upper surface heavily marked on the costa, and a dusky cloud behind the cell. Secondaries with a fuscous spot on the outer third of the costal margin.

Expanse of wings, 1.75 inch; length of abdomen, .8 inch.

Habitat. — Kansas.

From a specimen in my Collection, received from Mr. H. Strecker.

This beautiful species is allied to *C. scitiscripta* Walk.,* and *C. multiscripta* Riley.† It cannot be the former, which it more nearly resembles, as that is described with three thoracic bands, the fore-wings with an ochraceous tinge, and the wings [the four] with black marginal dots. In a pen-and-ink sketch of the typical specimen in the British Museum, kindly sent me by Mr. Butler, the marginal dots of the secondaries are represented. *C. candida* is the only species of the genus which we have seen, in which these spots are absent from the secondaries, and in which the wings are entirely white.

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* *List Lep. Ins. Br. Mus*, Pt. xxxii, p. 408. 1865.

† *Trans. St. Louis Acad. Sc.*, vol. iii, p. 241. 1875.

Mr. Strecker, to whom I communicated the MS. name of this species, together with its distinctive features as observed by me, expresses, in letter, his opinion that it may prove to be but a form of *scitiscripta*, inasmuch as some of his examples "show no thoracic band at all, not even traces of it, and again, others (four examples ♂ ♀) have the usual black marginal spots of the secondaries very distinct, so much so as any *scitiscripta* I ever saw; the veins on secondaries in some are also dark, like *scitiscripta*."

Should this species be shown to vary to the above extent, it would be an anomaly in the genus, for nothing approaching so great variation has come under my observation in the course of my critical study of the several species. To the contrary, I have found the species to be remarkably constant in their ornamentation.

I would not hesitate to refer examples so differently marked as indicated by Mr. Strecker to distinct species, in the absence of sufficient evidence of their identity.

The above descriptions are published at the present time, in advance of an extended paper on the species of CERURA — American and European — which, as is known to many of my correspondents, was commenced some time ago. It has been delayed, from my inability to obtain a few species which it seemed desirable to embrace in it, and from not having been able to arrange for the satisfactory illustration of the paper.

I avail myself of the present opportunity to express my obligations to my friends — to Messrs. Bowles, Canlfield, Grote, Hill, Hoy, Kuetzing, von Meske, Pearson, Riemann, Riley, Strecker and Tepper — who have freely loaned me all the examples contained in their collections, and have most generously permitted me to retain them for an unusual length of time.

XV. ON CARADRINA FIDICULARIA MORR.

This species was described as *Segetia fidicularia* by Mr. Morrison, in *Proc. Bost. Soc. Nat. Hist.*, vol. xvii, p 145. In the Grote Check List (No. 456) this name is recorded as a synonym of *Caradrina ?multifera* Walker. In vol. viii, p. 188 of the *Canadian Entomologist*, Mr. Grote refers the species to the European *C. cubicularis* S. V., from a comparison made by him, with a male example of the latter. noting as the only difference between the American and the European forms, that the latter has the common line beneath more extended, and the hind wings white.

With four examples of *C. fidicularia* before me (three in nearly perfect condition), and two of *cubicularis*, I am compelled to differ from the reference made by Mr. Grote. I note the following points of difference, as my reasons for regarding them as distinct.

While in *C. fidicularia* the primaries are of a clear gray, in *cubicularis* they are of a peculiar pale brownish shade, difficult to designate, bearing what might be called an amber tint. In the former, the intranervular marginal black dots are more conspicuous than in the latter, and its subterminal line is not followed by whitish ; the posterior transverse line is farther removed from the reniform than in *cubicularis*. *C. fidicularia* has a well marked discal dot, which the other has not. The primaries of the American species are the broader.

The secondaries of *fidicularia* are of a fuscous shade, increasing in depth toward the margin ; in the other they are white, with the end of the nervules and extreme margin tinted with ochraceous. In the latter, no discal spot is seen from above. while in the former it is quite conspicuous — the heavily marked dot of the lower surface showing in transparency.

C. cubicularis is known to be a variable form, differing greatly. according to Guenée, in size, depth of color, and intensity of designs, having been described under the several names of *quadripunctata* Fabr., *segetum* Esp., *callisto*

Engr., *blanda* Haw., *superstes* Steph., and *leucoptera* Beck. But the difference of color between our form and the European does not come within the range of variation thus far shown in any of the species accepted as common to the two countries.

These colorational differences have been critically studied by Dr. Speyer, during the comparisons in which he has been for some time engaged, of the identical and closely allied Noctuidæ of Europe and America, and some of the results of which have been given in a series of papers, four in number, communicated to the *Entomologische Zeitung zu Stettin* for the years 1870 and 1875. In his second paper on *Europäisch-amerikanische Verwandtschaften*, p. 102, these differences (probable climatic modifications) are so admirably presented, that a translation of that portion of the paper, kindly furnished for the purpose by Mr. Grote, cannot but prove most acceptable to those engaged in the study of the Noctuidæ who may not be able to avail themselves of the original.

"In the gray and brown colors usual to the Noctuidæ, arising from a mixture of black, white and red, the American specimens, as a rule, show less red than the European, and more black.

"This appears generally in the color of the abdomen and the hind wings; the brown-gray of the European forms becomes clear gray or blackish-gray in the American. The red cast which shows on the gray undersurface of the wings of many brown species, especially on the edges, becomes very faint in American varieties, and is even, at times, wanting. The red brown of the back and fore-wings becomes more gray, blackish or bluish. A stronger mixture of black darkens the colors of many American forms. The ornamentation (such as costal marks and sagittate points) is often made more distinct and coarser; the transverse lines and discal spots are thrown more into relief by their deeper black defining lines.

"But, in opposition to this rule, with regard to gray and brown colors, those arising from a mixture of yellow and red, show more red in American specimens; and where there is a mixture of black with these latter colors, producing a rust-color, the black is less perceptible, as for example, in the case of *Orthosia ferrugineoides*, *Hydrœcia nictitans*, *Plusia Putnami* and *Brephos infans*.

"If there is any change in the shape of the wings, it seems to be more usual for the American specimens to have them broader and shorter than the European.

"Only to the first-named modification in the mixture of gray and brown colors, might some importance be attached, since it seems to pertain, although not without exception, to the majority of compared species, and may therefore be referred to a common cause, arising from the different climates of continental eastern North America and insular western Europe. Which of the many climatic factors influences this modification of color — whether it is due to the more intense heat and dryness, or to the severe winter of the transatlantic faunal territory, or to both combined and as opposed to the cooler and damper summers and milder winters of the cisatlantic — cannot now be determined. It is well known that the coloration becomes generally darker and blacker as we approach the pole or ascend in elevation; but it is doubtful if the greater cold of the winter is the real cause of this effect."

C. fidicularia appears to be a rare species with us. Mr. von Meske has taken it, at sugar, at Sharon Springs, N. Y., on August 15th, in two examples. Mr. W. W. Hill has captured it in Lewis county, N. Y., on August 1st, also at sugar. I have taken it on but one occasion, at Schoharie, N. Y., on 5th of September. It has not made its appearance, at sugar, during my two years' collecting by that method at Schenectady. Mr. Morrison's example was from the Adirondack region. A species, believed to be the same, and referred to *C. multifera* Walker, in Vol. I, of the *Canadian Entomologist* (page 84) was captured at Coburg, Ontario. Mr. Walker's specimen was from Nova Scotia.

C. cubicularis is stated by Guenée to be very common in the months of June and September. Wood (*Index Entomologicus*, p. 44) refers to it as common in gardens and meadows during the middle of June. Dr. Speyer in his *Fauna of Waldeck*, represents it as common throughout the month of May, and with a second generation, less abundant, extending from the latter part of June to the last of August.

A delay in the printing of these papers enables me to add to the manuscript as above prepared, a comparison made by Dr. Speyer, at my request, of *C. fidicularia* with the European species. He writes as follows:

"Of *C. fidicularia* I have but a single specimen, and I should not dare to give an opinion as to its distinctness, were it not, fortunately, for a decided difference presented in the antennæ. In *C. cubicularis* the antennæ are short and evenly clothed with cilia which are only one-half so long as in *C. fidicularia*; in the latter species their length is about equal to the diameter of the antennal stem. Furthermore, my example lacks the rust-brown bordering of the subterminal line, which is so conspicuous a feature in *cubicularis.* The apex of the wing in *fidicularia* shows a lighter shade between the subterminal line and the margin, while in *cubicularis* this portion is equally dark with the rest of the subterminal region. With these exceptions, I find no difference, except in the very different colors of the two. The white spots of the reniform, are also more or less distinctly seen in *cubicularis.* Whether the differences above stated are reliable, could only be determined by an examination of a number of examples. But the decided difference in the antennæ cannot be questioned, and this feature will sufficiently establish the specific distinction of the two forms. Their comparative size is of little importance, as CARADRINA varies very much in that respect."

XVI. THE LARVA OF HOMOHADENA BADISTRIGA.

Hadena badistriga GROTE: in Trans. Amer. Ent. Soc., iv., p. 20. 1872.
Homohadena badistriga GROTE: in Bul. Buf. Soc. Nat. Sci., i. p. 180. 1873.

The young larvæ, three-eighths of an inch in length, were discovered on May 30th, at Schenectady, N. Y., feeding on the leaves of the honeysuckle.

The mature larva measures 1.12 in. long, by .18 in. diameter. Head small, about one-third the breadth of the central segment, flesh-colored, spotted with dull green and with the frontal triangle bordered within and without by black; ocelli black.

Body cylindrical on segments 3–9, the last three rapidly tapering, the last one being less than half as broad as the central ones; the second segment (head not counted) slightly smaller than these, and the first a little broader than the twelfth: surface smooth, without hairs, except the usual minute setæ of the setiferous spots, conspicuously striped as follows: a broad substigmatal band, traversed by longitudinal waved lines, limited above by a black line on the thoracic segments which becomes obsolete on the fourth segment; a somewhat narrower stigmatal band of dull green —a whitish line traversing the stigmata, dividing the band equally in different shades of green; a subdorsal pale band limited above by a black line which is more distinct on the central segments where also the band is paler; above this a black stripe commencing on the fourth segment, becoming more marked on the central segments, and terminating on the ninth—this line bordered above by a corresponding one of white; dorsal stripe geminate, whitish on the thoracic and terminal segments—intermediately, expanding between the middle of each segment and its posterior portion to inclose a mesial black spot or spots resting on the incisure —bordered outwardly by olive-green, which by being broken at the incisures gives the conspicuous dorsal feature of two oblique dashes traversing the segments and approximating anteriorly; the four trapezoidal spots of each segment which rest on these dashes anteriorly, are white — the front ones the larger and marked with black on nearly one-half of their outer portion; on the second segment a large white spot rests on each green line bordering the subdorsal.

Stigmata small, broadly oval, black ringed.

Legs spotted with brown.

Several of the young larvæ were found during the month of May, at Schenectady, feeding on the leaves of the trumpet honeysuckle — the woodbine of Europe (*Lonicera periclymenum*). They were secured in a tin box and supplied daily with fresh food. Toward the latter part of the month and early in June, larvæ nearly full grown, were taken from the vines. They were generally found extended at rest upon some portion of the stem which so closely resembled their markings, that, added to their tapering extremities, they were with difficulty detected — appearing rather as enlargements of the vine.

From about twenty larvæ collected, twelve matured and formed their cocoons between the 9th and 16th of June.

The cocoons are elongate-oval in form, and five-eighths of an inch long by nearly one-fourth inch broad. They are of rather a slight texture, inclosed by leaves drawn around them, and were attached by their flattened under surface to the bottom and sides of the paper box to which they had been transferred; one cocoon, only, was fastened to a twig.

The remains of the pupa-cases found within the cocoons are of a chestnut-brown color, but were too much broken to afford any special features for description.

The first imago emerged on June 29th, having been twenty days in its cocoon. June 30th, five of the moths emerged, followed by others on July 3d and 4th.

Prof. Grote, in the *Buffalo Bulletin*, ut cit., mentions the larvæ as occurring on the common honeysuckle — *Lonicera sempervivum*.

XVII. DESCRIPTIONS OF TWO NEW SPECIES OF XYLINA.

Xylina lepida n. sp.

Anterior wings plumbeous gray; lines distinct, pale gray. Demi-line in two elongated teeth, bordered on each side with black. Anterior transverse line bordered behind by black, quite angulated, united with the orbicular, sharply toothed (more than in *X. Thaxteri*) on the submedian fold. Posterior transverse line bordered before with black, distinctly toothed on the veins, touching the reniform beneath in two of its inward inflections, and connected with the anterior transverse by a black line on the submedian fold. Subterminal line less sharply projected inward opposite the cell and on submedian fold than in *X. Thaxteri*, and bordered outwardly by a series of connected black lunules which are heavier than elsewhere against its more prominent inward inflections.

Discal spots distinct, gray, paler just within their black border, making almost a double annulation: orbicular large, oval, oblique, very near to reniform beneath: reniform elongate, nearly straight outwardly, quite exserted inwardly, with a black line within it on the median vein, distinctly bordered on all sides with black, but more heavily below; in *X. Thaxteri* the spot is more broadly edged beneath with black, and more deeply exserted outwardly; the two spots are connected at their extremities by a black line. A brown shade-band traverses the median space between the discal spots, terminating on the internal margin midway between the transverse lines.

Posterior wings pale fuscous, with a discal spot and an indistinct fuscous band before the outer margin.

Thorax, color of primaries, sprinkled with gray and prominently tufted. Frontal tuft and shoulder covers bordered with a black line followed by white. Abdomen untufted, reddish.

Beneath, wings reddish: primaries with a heavy discal spot and partly crossed by two extradiscal bands: secondaries with a distinct discal spot and median line.

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* *Lithophane lepida* Lintner MS. GROTE. in Bull. U. S. Geolog. — Geograph. Surv. Terr., iv, no. i, p. 181. February, 1878.

Expanse of wings from 1.50 to 1.56 inch.

Habitat.—New York; Maine.

Described from 2 ♂'s and 3 ♀'s, taken, at sugar, at Center, N. Y., on October 1st, 8th, 9th 12th and 15th, by Mr. W. W. Hill. The types are in Mr. Hill's cabinet.

This species has more resemblance to *X. Thaxteri*, than to any other of our known species. It lacks, however, the marked contrasts presented in paler ground color, the heavier black markings and the red dashed reniform of that species. The black line on the submedian fold is not so long or so heavy, and its posterior wings are not so dark.

It resembles more closely the *X. conformis* of Europe, but it has not the distinct basilar line, the claviform spot, or the broad reniform of that species. Its transverse lines are also more sharply angulated, and it is apparently a shorter-winged species.

Xylina unimoda n. sp.

Head and thorax cinereous. Abdomen above brownish, darker than the posterior wings.

Primaries glossy, bluish-cinereous, slightly paler at the costo-basal space, and with a few white scales on costal and basal regions. Transverse lines inconspicuous, scarcely visible without a magnifier, pale gray, faintly bordered by a darker shade. Median band faintly visible, angulated on the lower portion of the reniform. Anterior transverse band prominently toothed; the cellular teeth separated from the orbicular; the two small teeth inclosing the submedian fold, with some whitish scales interiorly, and outwardly continued in an acute claviform mark. Posterior transverse line dentate, removed from the reniform. The obsolete subterminal line preceded by intranervular fuscous sagittate spots. Orbicular spot pale gray, darker scaled interiorly, either connected with or detached from the suborbicular, which is gray-bordered above. Reniform inconspicuous, cinereous, with a black border more heavily marked below, and edged within by gray.

Secondaries pallid, slightly darker along the margin, with paler fringes, which are almost white near the anal angle, a distinct cellular spot, and faint median line.

Beneath, secondaries paler than in *X. laticinerea* and less thickly sprinkled with fuscous scales.

Size intermediate to *X. cinerea* and *laticinerea.*

Habitat.—Center, N. Y.

Described from seven examples — 3 ♂'s, 4 ♀'s — taken at sugar, by Mr. W. W. Hill on the 5th, 8th and 12th of October, 1877. Types in Mr. Hill's Collection.

This species can be separated from *X. laticinerea* to which it is closely allied, by its uniform cinereous shade, without black lines or spots; by the absence of the black basilar line on the submedian fold edged above by white, and of reddish-brown scales in the reniform. Its orbicular is nearly round, and lacks the extension and obliquity seen in *laticinerea.*

XVIII. NOTES ON CUCULLIA LÆTIFICA LINTN.

In the *Check List of the Noctuidæ of America*, by A. R. Grote, I had described (on page 24), the above species from a male specimen received by Mr. O. von Meske from a correspondent in Bastrop, Texas, as follows :

Closely allied to *C. Speyeri.* The anterior wings are narrower and less curved anteapically than in that species ; they are of a paler gray shade. The subobsolete reniform and orbicular spots are marked with ochraceous-yellow dashes ; a streak of the same color rests on the subcostal nervure at its base and another within the inferior tooth of the anterior transverse line. This line is more acutely toothed than in *Speyeri.* The oblique black streak in cell 1 b, is faintly bordered above with ochraceous-yellow ; the two small teeth of the posterior tranverse band, which are divided by the submedian fold are of nearly equal length, while in *Speyeri* the one below the fold is much the longer ; between these teeth and the opposed teeth of the anterior transverse line is a white spot, resting on the fold and reaching nearly half way to the nervure on each side. Terminal margin lined distinctly with black, interrupted by the nervules.

Posterior wings hyaline, with a very narrow lustrous brown border, and nervules covered with brown scales. Cilia white.

Expanse of wings 1.90 in. Length of body exclusive of anal tuft, .80 in.

Through the kindness of Mr. E. L. Graef, I have been permitted to examine three females of this species, received from Texas, one of which had been sent to him under the name of *Speyeri.* While closely allied to *Speyeri*, as above indicated, the distinctive features of narrower and less apically-rounded primaries, a lighter gray shade, ochraceous markings, et cet., are fully sustained by this additional material. The posterior wings of this sex have a narrower marginal brown border than in *Speyeri*, where it occupies, opposite the cell, nearly one-third of the wing, but in this, less than one-fourth. The wings in this species are more hyaline than those of *Speyeri.*

The nervular-interrupted black terminal line of the posterior margin of the primaries, is a good feature to distinguish this species from *Speyeri*.

In none of the four examples of *lætifica* before me, can the outlines of the orbicular and reniform spots be traced, or even approximately lined by comparison with congeneric examples. (It is proper to state that they are all in a somewhat imperfect condition.) In each, the lower portion of the reniform is so well defined, that, from its position and extent it might readily be mistaken for a portion of the posterior transverse line. It can be followed as a black line from vein 5, curving downward over 4 and 3, and then upward over the median at about the anterior third of the space between 3 and 2. In *C. intermedia* this line has the same extent but is less curved over 4 and 3.

In the type specimen of *lætifica*, traces of the orbicular are visible as two pale brown dashes, separated by a tooth of the anterior transverse line lying above and back of the point of bifurcation of the median and vein 2. It is believed that the form of the orbicular of *lætifica* (and also of *Speyeri*), should it hereafter be traceable in perfect examples, will prove to be that of a figure 8, or two contiguous ellipses of which the lower is the larger — quite unlike the quadrate form in *postera* and *asteroides*, and in *absynthii* and *asteris* of Europe.

Expanse of wings of ♀, from 1.58 to 1.88 inch. Length of body from .7 to .78 inch.

From 1 ♂ in the Collection of Mr. Otto von Meske, 2 ♀'s in the Collection of Mr. E. L. Graef, and 1 ♀ (through the favor of Mr. Graef) in my Collection.

Previous to the detection of this species, I had determined a Texan CUCULLIA of Mr. Morrison, as *Speyeri*. Since then, it has not been convenient for me to review the determination, but I think it probable that a re-examination would show it to be a *lætifica*, and consequently that *Speyeri* has not been received from Texas.

XIX. NOTES ON CATOCALA PRETIOSA LINTN.

This species is closely allied to *C. polygama* Guen. Its distinctive features may be more clearly appreciated by a differential comparison with that species. The basal region is conspicuously and broadly shaded with black, deepening toward the anterior transverse line; in *polygama*, shaded with ferruginous. The anterior transverse line is geminate, moderately oblique in its general direction, tending to the posterior third of the internal margin, distinctly separated by white below and slightly above the submedian: in *polygama* the line is quite oblique, tending to, or very near to, the internal angle, and is preceded below the submedian by gray and ferruginous scales.

The posterior transverse line has the extra-cellular teeth moderate, unequal, the lower one in cell 4 being improminent; moderately angulated outwardly (not toothed) on the submedian fold before the sinus; the sinus short, not extending to the middle of the wing, the line narrow with ferruginous and white below it; from the sinus, running direct and slightly oblique outwardly to the internal margin, followed by a white line. In *polygama* the two teeth are conspicuous and nearly equal; sharply toothed outwardly on the submedian fold, as in *C. cratægi;* sinus long, reaching the middle of the wing. the line broad, with ferruginous on each side and without white below; below the sinus, a long and sharp tooth bordering the internal margin.

The two transverse lines are separated on the submedian nervure by a space equal to the width of cell 2 on the terminal margin, whence they run parallel to the internal margin; in *polygama*, they are nearly or entirely united on the submedian, beyond which they widely diverge and again wholly or nearly unite on the internal margin.

The reniform is broadly surrounded by white; in *polygama* narrowly. The subreniform is round, its outline defined by black scales; it touches outwardly the median shade-line on vein 2; of the two transverse lines, it is nearer to the posterior, or midway between them: in *polygama* it is subquadrangular, defined by ferruginous scales, is quite removed from the median shade-line, and is nearer to the anterior transverse line, sometimes quite approximate to it.

The subterminal line is dark brown; in *polygama*, pale gray. The posterior wings have the marginal band slightly narrowed on the submedian fold: in *polygama*, it is separated or quite constricted; beneath, the cellular fold is shaded with black (not in *pretiosa*).

In size it is smaller than *polygama*, five examples of which before me measure in expanse of wings, males 1.80, 1.85 and 1.90 inch; females 2 and 2.1 inches. *Pretiosa* males 1.60 and 1.70 inch; females 1.80 inch. The wings are proportionally broader than in *polygama*; they are more clouded with black basally, with more white medially, and with less ferruginous in the terminal region.

Three examples of the species were captured by me at sugar, at Schenectady, N. Y., last year — the two males, in perfect condition, on July 8th and 10th, and the female somewhat worn, on July 16th.

A fine example of *C. cratægi* Saunders was also taken by me at sugar, on the 17th of July. I had recognized it as an undescribed species at the time of its capture, and had so indicated it in my Collection. With the larval state of nearly all of our Catocalas unknown, it is very gratifying that Mr. Saunders has been so fortunate as to be able to accompany the description of the imago with that of its larva

C. polygama was taken but once by me last season, viz., on the 7th of July, in perfect condition. The examples which I have seen of this species present very little variation. The variability which has been ascribed to it probably arises from the confounding with it of *cratægi*, *pretiosa*, and perhaps some other species. — *Canadian Entomologist* for July, 1876.

Since the publication of the above, through the favor of Mr. G. W. Peck, of New York, I have been able to see additional examples of the species, which show some variation from my type specimens. In those, the marginal black band of the secondaries is continuous, presenting only a constriction on the submedian fold, acute in the female, and approaching to a separation, but slighter in the male. In a pair received from Mr. Peck, the band is disconnected on the fold, to the same extent in each sex. They also show variation in the shape of the subreniform, — that of the female being more oval than in the type, and of the male, subquadrangular.

It is believed that the tawny band of the primaries beneath, separating the marginal and median black bands, may afford valuable differential features in closely allied species of CATOCALA. Thus, in the four examples above referred to, the band is sharply and almost rectangularly reflected on vein 4, thence running direct with regular contraction to the internal margin.

In *C. cratægi*, the form and course of this band are similar to that of *C. pretiosa*, but its breadth is less.

In one example of *C. præclara*, the band is less acutely bent between veins 3 and 4, and again sharply between veins 1 and 2, from which point the lower portion of the median black band is continued very narrowly to the inner margin.

In one *C. fratercula*, female, the tawny band is regularly curved, with the exception of a moderate outward bending on the submedian fold.

Mr. Peck informs me that he captured a number of examples (12) of *pretiosa* last year (1876) at Morristown, N. J. For several years the species had been in his collection under the name of *polygama*. This latter species had never, to his knowledge, been taken in the vicinity of New York, but he had received it (not identified at the time) from Canada. Two examples of *C. pretiosa* were also taken by Mr. F. Tepper, at Flatbush, L. I., during the season of 1876.

C. polygama, thus far, has proved to be comparatively rare.* Its name is probably misapplied in many collections. The reference of *pretiosa* as a variety of that species may be presumed to arise from erroneous identification of one or both species.

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* Both *C. pretiosa* and *C. polygama* were collected, at sugar, at Center, in quite a number of examples, during July and August of 1877. The former species was not at all rare throughout the month of July. *C. polygama* was less common, but of longer continuance, extending into August.

XX. ON A NEW SPECIES OF HYPOCALA.

Among the unequaled collections in number, variety and rarity, made at the famous Center locality during the season of 1877, perhaps the most interesting capture is that which gives us, for the first time, representation of a genus of tropical insects of marked beauty, rivalling the Catocalas, to which they are closely allied.

Of the eight species of HYPOCALA described by Guenée (two of which are Fabrician species), five are from the East Indies, one from Africa, one from Honduras (N. Lat. 15°) and one from Hayti (N. Lat. 19°). That a species, typical of the genus, should occur in the State of New York (N. Lat. 42°), is a discovery of exceeding interest, adding, as it does, to our list of Noctuas, a peculiar and beautiful form, which, there is reason to believe, will long remain a rarity in our collections.

In consideration of the peculiar characters of these moths, Guenée, in his Noctuelites, Tome III, has arranged them in a separate family which he designates as Hypocalidæ, consisting of the single genus of HYPOCALA. The genus he defines as follows:

"Caterpillars unknown. Moths — Antennæ, medium, more or less pubescent in the ♂. Palpi very projecting, quite large, compressed, contiguous, with joints indistinct and ordinarily of triangular form—the last as scaly as the preceding. Tongue moderate. Eyes large and projecting. Frontal tuft elongated, carinated, thick and close (*serré*). Thorax oblong, scaly, stout. Abdomen long, swollen, not carinated above, somewhat hairy, yellow with black spots, bearing a small tuft at the base. Legs strong, slightly hairy. Wings subdentate; the superiors pulverulent, the subterminal line in part distinct: the inferiors yellow with a black border, having the nervule-independent [disco-central nervule — vein 5], inserted near the three others, opposite the 4th inferior [1st median nervule — vein 2]."

Guenée remarks: "The species of this genus are of medium size, and very similar to one another, so that their varieties would be absolutely confounding if the difference in the ciliation of their antennæ was not evident. The following is their general description:

"The superior wings are subdentate, of a powdery gray, bordering on a yellow, and usually dotted or striated with brown atoms. The orbicular is wanting, but the reniform is usually present, of an oval form and blackish. All the lines are indistinct except the subterminal, of which the inferior portion is always visible, blackish, slightly dentate, and followed by a contiguous, parallel, ferruginous line. The inferior wings are yellow, with a large cellular spot and a black border, irregular and interrupted near the anal angle by a spot of the color of the ground, as in CATOCALA. The under side of the same wings have the designs black and more distinct, and the costa gray. That of the superior is also yellow, with two black bands extending from the costa and terminating before the internal margin. The abdomen is not annulated with yellow and black as in HYBLÆA, but all yellow with some black bands occupying only the upper side of the segments, with the anus equally black above.

The Hypocalas inhabit India, Africa and America. They are not common in collections, where they are almost always found in a bad state."

The honor and credit of the discovery of this moth is due to Mr. W. W. Hill, of Albany, N. Y. I do not deem it an accidental discovery, but rather the direct consequence of so persistent and thorough a "working up" of a favorable locality by the aid of a greatly improved method of sugaring, that I believe I may venture the assertion that not even an approximation to it has hitherto been made in the annals of Lepidoptera collecting. While, therefore, I most earnestly deprecate the frequent introduction of names of individuals in our Entomological nomenclature,—often on no other ground than as a pretty compliment, an incentive to the enlargement of an amateur collection, or as a means of securing the favor of a collector, and while I would guard the honor as a just tribute, (valuable only from its rare bestowal), to those whose labors constitute a portion of the history of our science,—in the present instance, I have no hesitancy in proposing the name of the discoverer for association with the insect below described. The results obtained at Center during the year 1877, hereafter to be given to the public, will assuredly constitute an epoch in the collection of Noctuidæ, and an important chapter in their history.

Hypocala Hilli n. sp.

Antennæ scaled; under a microscope clothed with numerous short cilia on each joint, and with fascicles of longer ones, of the length on the basilar joints of about one-half of their diameter. In proceeding from the base toward the tip, these fascicles are less marked, until at about midway of the antennæ they have become changed into spinules, of which there may be three or more on each joint; toward the tip these spinules extend beyond the numerous short cilia to about once and a half the diameter of the joints, and are visible, as are also the fascicles, under an ordinary magnifier.

Palpi triangular, porrected, pointed, slightly beaked, pale brown sprinkled with black scales, as are also the head, prothoracic tufts and thorax: these latter tinged with ochraceous.

Abdomen yellow, the basal segments bearing some long dusky hairs. Segments 8–11, with a fuscous or black spot (black on the posterior ones) on their anterior two-thirds, approaching in form two mesially connected small segments of a circle. On the last segment a large black spot, triangular in front, extending on the sides and on the long anal tuft, of which the terminal portion is yellow, tipped with dusky. Sides of the abdomen with a row of five small black spots, and with its under surface pale yellow, sprinkled with black scales.

Wings: primaries sprinkled with black scales on a pale brown ground, which shows a distinct violet shade in a certain light, especially on their outer half, with a slight pale green reflection near the base on the inner portion of the wing. Costa delicately striated transversely with darker brown. Median lines and discal spots absent; the reniform traceable in a scarcely perceptible encircling line when sought for with a magnifier. Subterminal line ferruginous, bordered on each side with black, extending from opposite the cell just above vein 4, outwardly in two or three teeth to near the margin, then bending backward, and with some gentle curves, reaching the internal margin near the angle. The terminal line black, waved, and a yellowish one at the base of the fringe. The fringe brown, tipped with a darker shade. Secondaries of a luteous yellow, with their greater portion black, as follows: costal region blackish; apical portion broadly bordered with black, continued along the margin to vein 2, dividing at vein 3 where it runs inward, occupying somewhat the place of the median band in Catocala, bending downward to the internal angle, whence it runs along the internal margin to the base: within this, resting on the submedian, a broad black ray not reaching the band; a large black cellular spot, connected in its upper half with the black of the base and costal region, but disconnected from the submedian ray. Beneath, the black border and its inner continuation are better defined and narrower; the cellular spot is contracted to a narrow elongated subquadrangular black spot between veins 2 and 8; the submedian ray is wanting; costal region of both wings dotted with black. The under surface of the primaries is yellow, with a broad black straight band extending from below the costa to the submedian interspace, and another of the same length and of nearly twice the breadth, lying in the outer third of the wing, slightly indented on vein 5; apex and margin beyond this band, fuscous; costa slightly striated with black.

This species resembles *H. filicornis* Guenée, from Honduras, from which it is separable by its larger size, its non-striated primaries, etc. In its antennal structure, it is similar to *H. Pierreti* Guenée, from Hayti.

Expanse of wings, 1.90 in.; length of abdomen, .95 in.

From 1 ♀, taken at sugar at Center on Oct. 15, 1877. In the Collection of Mr. W. W. Hill.

Soon after the capture of the above, Mr. von Meske received from Texas, and has now in his Collection an example, which, notwithstanding some differences, should in all probability be referred to the above species. It was taken at Bastrop, Tex., (N. Lat. 30), by Mr. Heiligbrodt, on Sept. 2d, in perfect condition. It is of the same sex with the Center specimen — a fact deserving special mention, since all the descriptions of Guenée in which the sex is indicated (seven species), were drawn from ♂'s.

Both the reniform spot and the transverse lines are present in it: the former is conspicuously outlined in black, of an oval form, inclosing an oval ring of pale scales, of which the half toward the base of the wing is more distinct. Transverse lines single, brown, toothed: the anterior line moderately toothed, its general course nearly direct across the wing, except as strongly exserted outwardly below the median: the posterior line more prominently dentate, with three teeth between costa and vein 3, above which vein it is strongly bent inward so as to touch the lower end of the reniform and to extend beyond it for a space equal to its transverse diameter, thence curving outwardly, and with two angulations reaching the internal margin. There is a faint trace of a median shade running as a continuation of the lower half of the posterior transverse line. The thorax is concolorous with the wings, and together with the prothoracic tufts and head, is marked with a median brown line. The two basal segments have each a small black median tuft, a trace of one of which is visible in the Center example, the other having probably been lost in the partial denudation of the superior portion of the thorax. The antennal structure of the two examples is the same, and no material difference is noticeable in a comparison of the posterior wings.

XXI. ON THE IDENTITY OF HOMOPTERA LUNATA AND H. EDUSA.

Phalæna (Noctua) lunata DRURY. Illus. Nat. Hist., App. vol. ii. 1773.
" " *edusa* " Illus. Nat. Hist., App, vol. ii. 1773.
Noctua lunata WESTW.-DRURY. Illus. Exot. Entomol., v. i, p. 37, pl. 20. f. 3. 1837.
Erebus edusa, WESTW.-DRURY. Illus. Exot. Entomol., v. ii, p. 46, pl. 24, f. 4. 1837.
Homoptera lunata GUENÉE. Sp. Gen. Lep. Noct., vol. iii, p 12. 1852.
" *Edusa* " Sp. Gen. Lep. Noct., vol. iii, p. 14. 1852.
" *Saundersii* BETHUNE: in Proc. Ent. Soc. Phil., vol. ii, p. 215. 1865.
H. lunata and *edusa* BEAN: in Canad. Entomol., vol. ix, p. 174. 1877.

More than a century ago (in 1770). Drury, in the first volume of his admirable work cited above, illustrates a large and beautiful Homoptera from examples received from Virginia and Carolina, to which in the appendix to the second volume, he applies the name of *Phalæna (Noctua) lunata*. In the second volume (in 1773), he describes and figures *Phalana (Noctua) edusa*, a form from New York, differing from the preceding in having the subterminal space of the brown wings of a grayish or bluish white, which, on the superiors, is gathered in two lunulated spots.

From their wide distribution through several of the United States, their comparative abundance and their marked beauty, these two forms have found place in nearly every one of our collections of Lepidoptera, under the above names, and not unfrequently associated with their presumed companions of the opposite sex. Very recently, the interesting discovery has been made that the two constitute but a single species.

I was led to suspect the above relationship two years ago from the study of a few examples in my collection, and accordingly requested of some of my friends the careful inspection of their future captures, with a view of determining this point.

Since that time numerous examples of the two forms, have come under our observation, in all of which the females are *lunata* and all the males "*Edusa*." As no other differences except sexual are perceptible, beyond the colorational features, there is no longer reason for questioning the identity of the two forms, and the necessity of henceforth dropping the name of "*edusa*" from our lists.

It is fortunate that the specific name which is to be retained will now indicate a marked feature of the species.

There has always been an annoying incongruity in designating as *lunata* that one of the two closely allied supposed species which was without the lunulated spots.

In consideration of the suggestion and careful observations of Mr. Bean, given in a late number of the *Canadian Entomologist* (ut cit.), I have included, with doubt, *H. Saundersii*, in the synonymy of *H. lunata*. My two examples of this form are both males, but with only these at my command (the form appears to be quite rare in the Albany district), it would not be proper to form an opinion as to its relations.

XXII. ON THE IDENTITY OF TWO FORMS OF HYPENIDÆ.

In the *Transactions of the American Entomological Society* Vol. IV, pp. 105, 106, Sept. 1872, Mr. Grote describes *Tortricodes bifidalis* and *T. indivisalis*, provisionally as two species. He indicates the principal difference between the two, to lie in a cleft in the outer margin of the primaries of *bifidalis*. Although designating them by different specific names, he remarks, "I am inclined to consider the two forms merely as sexes of one species, with the fore-wings cleft in the male. And with four specimens of *T. bifidalis* before me, and eight of *T. indivisalis*, I cannot but be sure that most, if not all, of my *T. bifidalis* are males, and of my *T. indivisalis*, females. * * * I shall then not be disappointed if the two should prove to be sexual forms of one species."

Subsequently, same vol., page 308, Jan. 1873, Mr. Grote writes: "Mr. J. A. Lintner informs me that he has both sexes of *Tortricodes bifidalis* with cleft primaries. I then refer *T. indivisalis* to HETEROGRAMMA *Guenée*, believing our species not to differ generically from the Brazilian species which M. Guenée uses for his type."

In accordance with the above reference, the two forms have been known up to the present as *Tortricodes bifidalis* and *Heterogramma indivisalis*.

In a recent study of a considerable number of examples of each of the above two forms, collected at sugar, during the months of June, July and August of 1875, I was surprised to find that among so many, all having the cleft wing were males, and all with the entire wing, females. Suspecting, from this discovery, that the two were but one and the same species, I examined my cabinet example of *T. bifidalis* "female," and found that I had been misled by an unnatural position which the frenulum had assumed, but that it was unquestionably simple, not yielding even to pressure after having been detached from the wing, and, therefore, indicating a male. There was then, no doubt of the specific identity of the two differing forms.

As the description of *Tortricodes bifidalis* precedes that of *H. indivisalis*, the latter must give way as a synonym.

In some of its features this species does not conform to the definition of the genus to which it has been referred. It will probably need a new genus for its reception.

That a single species has at the same time been given place in two genera, should not in the least degree reflect upon Mr. Grote. The author of the erroneous information conveyed to him, as above quoted, is alone responsible for the mistake. That two forms, so very unlike in construction of wing, should have been believed, at the first, to be identical, gives assurance that the difficult task of identification of species often imperfectly described, description of new forms, and systemization of the North American Heterocera, has been undertaken by one peculiarly fitted for the work.

XXIII. DESCRIPTIONS OF TWO NEW SPECIES OF PHALÆNIDÆ.

Acidalia lacteola n. sp.

Antennæ, vertex of head and thorax white. Abdomen white, sprinkled with pale brown scales and with bands of the same color.

Wings white, thinly sprinkled with pale brown scales, marked with sinuous dark brown bands and following shade lines, and with elongated black discal spots; inner margins with long white hairs, of which those opposite the bands are black tipped and spatulate.

Primaries with three transverse lines dividing the costa into four nearly equal parts — the two interior ones somewhat the shorter: the extrabasilar band runs outwardly from the costa to within the cell, where it is acutely reflected to the submedian fold, then with an outward angle on the submedian to the internal margin: the interior line is strongly reflected outwardly to the subcostal, thence, outside of the discal spot, with sharp angles and followed by brown scales to the inner margin: the outer line is more sharply defined, less sinuous, having but three prominent outward reflections, and is marked by a transverse black spot on each vein. The shade-line beyond this consists mainly of brown scales between the veins, arranged in a sagittate form, especially seen between the median nervules — veins, 2, 3 and 4. Terminal margin marked with brown scales between the veins (the fringes absent in the example).

Secondaries: the inner and outer band of the primaries are continued, and present much the same character; they divide the wing on the median vein in three nearly equal parts.

Expanse of wings, .87 in. Length of body, .25 in.

Described from one example, a female, not in very good condition, in the collection of Mr. Otto von Meske. Received from Mr. L. Heiligbrodt.

Habitat.— Bastrop, Texas.

Cidaria Packardata n. sp.

This name is proposed for the species described and figured by Dr. Packard on p. 124, Pl. viii, fig. 52, of the *Monograph of the Phalænidæ*. It is regarded by him as identical with the European *Phalæna populata* Linn., and a generic name applied to it and to several allied species, taken from the Tentamen list of Hübner's Stirps — PETROPHORA.

The two forms are so very different in contour of wings, markings and color, that it is difficult to understand how they could have been united. In *Packardata*, the primaries are quite excavated from the apex to vein 4, at which point, in one of the males before me, they are distinctly angulated; the secondaries are slightly angulated on vein 4. In *populata*, a scarcely perceptible excavation may be seen below the apex of the primaries, and the margin of the secondaries is regularly rounded.

In *Packardata*, the broad basilar band is composed of three lines, the first and second of which approximate, and are separated by pale yellow; the second and third are distant, with dark yellow between. In *populata*, the band consists of but two lines with pale yellow between, or a third line may be faintly seen *near the third*.

In our species, the whitish band between the basilar and mesial bands is more sharply angulated toward the costa above the median vein, and its outer border is more strongly toothed. The outer border of the mesial band differs very materially in its course from the same line in *populata*, in its running in a nearly direct line, with only a slight bending backward between veins 5 and 7, to near the outer margin of the wing, whence it proceeds to form two prominent produced teeth in cells 2 and 3. In *populata*, these teeth are comparatively improminent; they are at nearly twice the distance from the outer margin as compared with the other species; the excavation on vein 5 is deep and rounded, and thence, the course of the line to the costa is nearly parallel to the hind margin instead of quite oblique to it. The distinctly marked, lunulated, subterminal line of this species is barely indicated at its extremities in our form, in which there seems to be no place for it medially, from the approximation of the dentations of the mesial band to the outer margin. The subapical patch is large, uniformly dark, subsemicircular in outline, while in *populata* it is reduced to nearly a blackish oblique streak, behind which is the uniform shade of the terminal margin.

In color, *Packardata* is of a pale yellow, with great contrast between the ground color and the interior bordering of the two bands: *populata* is more uniform in its darker ochraceous shading, with the darker yellow tending to a diffusion over the whole of the mesial band. Our species is also of a larger size than the European, two examples measuring respectively 1.50 in. and 1.38 in., while the examples of the latter before me are but 1.25 in. in expanse.

Material under observation: One male of *C. Packardata*, from Collection of Otto von Meske, made at Sharon Springs, N. Y., August 14, 1875; one male from Collection of W. W. Hill, taken in Lewis county, N. Y., July 27, 1876. Of *C. populata*, two males and one female received from Dr. Speyer, of Germany, from Collections of Mr. von Meske, Mr. Hill and my own.

C. populata is very well represented on Pl. 22, fig. 590 of Wood's *Index Entomologicus*, in its characteristic shape of wings and disposition of bands. Its habitat and apparition are there given as "common in the north of England and in Scotland, in July." It is referred by Stephens to the genus ELECTRA.

XXIV. A NEW LOCALITY FOR BREPHOS INFANS MŒSCH.

This beautiful moth, possessing peculiar interest from its abnormal characters, its northern habitat, and from its close resemblance to the *B. Parthenias* of Europe, is rarely captured by the collector, and has been observed, so far as we know, in only few localities in the United States. Mr. Grote, in *Trans. Amer. Ent. Soc.*, I, p. 189, gives as its range, Labrador, southward through the Eastern States. In the *Canadian Entomologist* for 1875, VII, p. 40, we have the statement that "Mr. Kuetzing, of Montreal, has discovered a locality for *B. infans*, in a clump of white birch, north of the village of Hocheloga—the first record, it is believed, of its occurrence in this province [Quebec]." It was subsequently taken, in a number of examples, at Hyde Park, Mass., among white birch.

Its association in the above instances with the white birch, coupled with the knowledge that the European species *Parthenias*, *vidua* (notha), and *puella* (that of the Siberian *Middendorfii* not stated), also feed on birch, rendered it almost certain that our species would be found to have the same food-plant.

At the Center locality, and extending a mile or more in either direction, the N. Y. Central Railroad is bordered or has recently been, with a thick growth of white birch. It occurred to me that this would make a very fitting home for *B. infans* if its range extended to New York, and I accordingly suggested the probability of its presence there, to one of my entomological associates, Mr. W. W. Hill, who, I had reason to believe, would discover and capture it, if my surmises were correct. At about the time when it might be expected to appear, Mr. Hill visited the locality, found the moth, and was able to secure examples for his cabinet.

At my request, he has kindly furnished me with a statement of its discovery and capture, which I find to contain so many interesting particulars of the habits of the moth, as also of another extremly rare species (previous to 1876), that instead of extracting from it, I present it in full:

"In accordance with your suggestion that *Brephos infans* might be found at Center, on the 3d of April last [1876], I took the early train for that place. From 7. 30 A. M. to 12 M., I searched through the white birch swamps without meeting with one, but on emerging in a clearing on the west of the timber, I was at once brought in view of a half dozen or more, sailing around, at a height of from ten to twenty feet above the ground. In striving to capture a specimen, I observed that it would manage to keep from fifty to a hundred feet distant from me, except when flying swiftly by. They were evidently well aware of my presence. At 1.30 P. M. when moving very slowly and scanning closely the ground and brush, a *B. infans* rose from an open spot surrounded by some newly cut birches. To my great delight, I captured it. It proved to be a fresh and perfect specimen — taken, perhaps, in its first flight. Although they continued to fly for some time afterward, I failed to secure another.

April 17th, I again visited Center, but searched in vain for more of the *infans;* not a single example was to be seen. The day was colder, with more wind and but little sunshine. As the weather became more unfavorable, I left the birches and devoted the remainder of the day to examining the fences along the railroad, and was well rewarded by the capture of three examples of the rare *Xylina fagina.*

April 20th, visited the locality for the third time. At 1 P. M., I captured my second *infans* — this time resting on a small white birch — the wind blowing freshly toward me, with the sun bright and warm. I observed at least a dozen others, but did not succeed in taking another, although the chase was perseveringly continued for several hours. I repeatedly saw them alighting on small birch trees, but the moment a movement was made toward them, although at a distance of a hundred feet, it was noticed, and the moth at once took wing again. Later in the afternoon, the fine weather changed to cold and blustering, with snow, and as not a single *infans* was to be seen, I went in search of *Xylina fagina.* My examination of the fences was rewarded by the capture of nine specimens of the species — including those previously taken, twelve in all. Of these, ten were found at rest on the upper edge of the fence-boards (very singularly, none were on the upper board), the other two were on the more exposed north side of the fence. It seemed as if these little creatures had come out to enjoy the cold and driving snow-storm, which certainly failed to add to my comfort. At a late hour in the afternoon (5 P. M.) I also had the good fortune to secure a *Lobophora geminata* (Grote).

Neither of the above three species had before been found in this locality.

Subsequent trips gave me no additional examples of *B. infans*, although I saw it in flight — quite wild — so late as May 7th."

Guenée, in his Noctuelites, II, makes some interesting remarks on the habits of the European species of BREPHOS, which is here transcribed:

The caterpillars live on the tall trees, from which, letting themselves fall, they hang suspended by a thread, after the manner of many of the Geometers. They are found in autumn, in woods of considerable extent, and their moths fly in the first days of spring, or as might better be said, at the end of winter, about the leafless birches. Their flight is lively, jerky (*saccadé*) and rapid, but the sun is indispensable to draw them from their torpor. Hardly do its rays veil themselves, even for an instant, when the Brephos arrest their flight, to resume it as soon as it commences to shine. In these habits, they bear much resemblance to the Phalænidæ which like them fly in the early spring; and there is also a resemblance in the habits and forms of the caterpillars.

Mr. C. P. Whitney, of Milford, N. H., writes me in relation to the habits of *B. infans:* "I take it very early in the spring (this year [1877]) about the middle of April, only in the vicinity of the white birch (*Betula populifolia.*) Its season is about two weeks. Their flight is rapid and irregular, so that it is almost impossible to capture them except when resting on the ground, when almost every one discovered can be easily taken. Late in the season they fly high and alight on the twigs of the birches."

XXV. NOTES OF CAPTURE OF LEPIDOPTERA IN 1876.

RARE TO THE VICINITY OF ALBANY.

Argynnis Idalia Drury — quite rare in this vicinity — was captured at Center on September 16th.

Phyciodes Batesii Reak., was abundant at Center, on the 17th of June, when twenty-five examples were collected in a short time — the sexes in about equal number.

This is apparantly quite a local species, and so far as known, occurring in limited localities in New York, Pennsylvania and Virginia. It may usually be found in Center during the first half of June — my earliest recorded observation of it being May 31st, and latest June 22d. It has also been taken by me in limited numbers at Schoharie, N. Y.

Several specimens of *Pholisora Catullus* were collected in Bethlehem on the 12th and 13th of July. This species had been so diligently sought for in former years that it is difficult to see how it could have escaped detection if it had been a habitant of the locality for any considerable length of time. Its ascribed food-plant, *Monarda punctata*, is not known to the State Botanist to occur in this portion of the State. Mr. Scudder records *P. Catullus* as "very rare in New England, found in southern portions." (*Proc. Ess. Ins.*, III, p. 170.)

Eudamus Lycidas (Sm.-Abb.), was taken by Mr. W. W. Hill, at Center, on June 15th. It had previously been found by Mr. Edwards at Newburgh, N. Y., ninety miles south of Albany.

Sphinx luscitiosa Clem.— One of the most rare of our New York sphinges — was captured in perfect condition, at Center, on the 3d of June.

Euchætes Oregonensis Stretch, was not at all rare at Center during the month of May — a single collector taking thirty-three examples of it, viz: eight examples on the 10th, four on the 13th, twelve on the 16th, four on the 19th, three on the 20th, and two on the 24th. Mention of the collection of two examples of the species at the same locality is made in the 26th *Report of the N. Y. St. Mus. of Nat. Hist.*

Spilosoma latipennis Stretch (see Report ut cit., p. 144), occurred in a single example at Center, on June 10th.

Nephelodes violans Guen., in forty examples were taken at Bath-on-the-Hudson, between August 30th and September 15th, by Mr. Hill. It had not been observed in this vicinity for several preceding years.

Among the above are several examples which conform to the description given of *N. minians*, but its separation seems to rest on no other ground than depth of color, and in these, all the intermediate grades are to be found.

It is worthy of mention, that not a perfect example of *N. violans* has thus far been captured, or is present in any of the Albany collections.

Mr. R. Thaxter, in his list of Noctuidæ, taken at Newton, Mass. (Psyche, II, p. 36), states the fact, that the examples of *N. minians* (probably the same above recorded as *N. violans*), were almost always in poor condition.

Mr. William Grey, a collector of Lepidoptera for many years, has been rewarded for the additional attention which he has recently given to Entomology, by the capture of four species of CATOCALA, never before taken in the vicinity of Albany, viz.: *C. Epione* West., *C. flebilis* Grote, *C. Robinsoni* Grote and *C. coccinata* Grote — a single example of each species.

That graceful and beautiful Sphinx, *Chærocampa tersa* (Linn.), not previously taken so far north as this, it is believed, is also one of the rarities captured by Mr. Grey.

The above were taken upon the grounds of Mr. Erastus Corning, at Kenwood, near Albany.

COLLECTIONS IN 1877.

In advance of a more extended notice of the extensive and interesting collections recently made near Albany, the following species may be mentioned, as of special interest from their rarity. Not one of the number had previously been taken in the Albany district, and less than half the number were represented in the Albany collections, from other localities. With few exceptions they are from the Center locality.

Thyatira pudens *Guen.*
Charadra propinquilinea *Grote.*
Diphthera fallax *H.-S.*
Acronycta grisea (*Barn.*).
Acronycta tritona (*Hubn.*).
Acronycta lobeliæ *Guen.*
Acronycta Radcliffei (*Harvey*).
Acronycta dactylina *Grote.*
Acronycta luteicoma *Grote.*
Acronycta subochrea *Grote.*
Acronycta ovata *Grote.*
Acronycta albarufa *Grote.*
Acronycta exilis *Grote.*
Acronycta lithospila *Grote.*
Agrotis turris *Grote.*
Agrotis albipennis *Grote.*
Agrotis perpolita *Morr.*
Agrotis opacifrons *Grote.*
Agrotis dilucida *Morr.*
Agrotis badicollis *Morr.*
Agrotis janualis *Grote.*
Agrotis phyllophora *Grote.*
Agrotis mimallonis *Grote.*
Agrotis Bostoniensis *Grote.*
Agrotis fumalis *Grote.*
Agrotis cupida *Grote.*
Agrotis Hilliana *Grote.*
Agrotis pressa *Grote.*
Mamestra lubens *Grote.*
Mamestra lilacina *Harvey.*
Mamestra assimilis *Morr.*
Mamestra vindemialis (*Guen.*).
Mamestra congermana (*Morr.*).
Dianthœcia modesta *Morr.*
Hadena leucoscelis (*Grote*).
Hadena arna (*Guen.*).
Hadena algeus *Grote.*
Polia diffusilis *Harvey.*
Dryobata stigmata *Grote.*
Morrisonia evicta *Grote.*
Morrisonia vomerina *Grote.*
Conservula anodonta *Grote.*
Phlogophora v-brunneum *Grote.*
Gortyna appassionata *Harvey.*
Gortyna nebris *Guen.*
Gortyna purpurifascia *Gr.-Rob.*
Caradrina bilunata *Grote.*
Crocigrapha Normani *Grote.*
Orthosia euroa (*Gr.-Rob.*).
Glæa tremula *Harvey.*
Glæa apiata *Grote.*
Glæa venustula *Grote.*
Glæa pastillicans *Morr.*
Xanthia togato (*Esp.*).
Scopelosoma ceromatica *Grote.*
Scopelosoma Græfiana *Grote.*
Scopelosoma devia *Grote.*
Scopelosoma vinulenta *Grote.*
Scopelosoma tristigmata *Grote.*
Xylina ferrealis (*Grote*).
Xylina signosa *Walk.*
Xylina semiusta (*Grote*).
Xylina Georgii (*Grote*).
Xylina unimoda *Lintn.*
Xylina Thaxteri (*Grote*).*
Xylina tepida (*Grote*).
Xylina pexata (*Grote*).
Xylina Baileyi (*Grote*).
Xylina querquera (*Grote*).
Xylina lepida *Lintn.*
Xylina capax (*Gr.-Rob.*)
Calocampa nupera *Lintn.*
Calocampa cineritia *Grote.*
Calocampa curvimacula *Morr.*
Lithomia germana (*Morr.*).
Xylomiges tabulata *Grote.*
Abrostola ovalis *Guen.*
Plusia formosa (*Grote*).
Lygranthœcia brevis *Grote*
Hypocala Hilli *Lintn.*
Catocala tristis *Edw.*
Catocala minuta *Edw.*
Homoptera unilineata *Grote.*
Homoptera obliqua *Guen.*
Homoptera benesignata *Harvey.*
Homoptera Woodii *Grote.*

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* Stated by Dr. Speyer to be a well marked variety of *Xylina lambda* Fabr.

XXVI. NOTES ON SOME LEPIDOPTERA.

Grapta Satyrus Edw.: in Trans. Amer. Ent. Soc., II, p. 374.

An interesting discovery, and addition to our New York Fauna, is the recognition of the above species, among the collections made by Mr. W. W. Hill, at Fenton's, Lewis Co., (Adirondack region) during the season of 1877.

The type specimens, described as above cited, were from the Rocky Mountains in Colorado. In 1871, the butterfly was reared by Mr. Henry Edwards, from examples of the larvæ found by him on a species of Urtica, at Congress Springs, Santa Clara Co., Cal. The larva is described and figured, from a MS. and drawings by Mr. R. H. Stretch, in Edwards' *Butterflies of North America* I, p. 120, pl. 40. On the same plate, the butterfly is beautifully represented in both surfaces and sexes. Mr. Edwards also credits the species to New Mexico, Oregon and British America.*

The occurrence of this species in Northern New York is believed to be but the second instance of its collection east of the Rocky Mountains. The larvæ were found by Mr. C. W. Pearson, of Montreal, Quebec, feeding on nettle, at Chateaugay Basin, about fifteen miles south of Montreal. The butterflies emerged after a pupation of ten or twelve days. †

Lycæna Lucia Kirby and **L. pseudargiolus** Bd.-Lec.

In consideration of the interest attaching to these species, from the identity shown by Mr. Edwards, of *L. violacea*, *L. pseudargiolus* and *L. neglecta*, (see *Canadian Entomologist*, vol. x, pp. 9, 10), and the suggestion by the same author, that *L. Lucia* may prove to be but a northern form of the same, I give below some memoranda kindly furnished to me by E. C. Howe, M. D., of Yonkers, N. Y., of observations made at that locality:

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* Catalogue of the Diurnal Lepidoptera of North America, p. 28. 1877.

† Canadian Entomologist, vol. vii, p. 216 1875.

"*Lycæna Lucia* was first observed on April 17th [a month earlier than its Albany record — see p. 55], and lasted until May 17th. *L. neglecta* first appeared May 21st, and continued throughout June, quite common. It afterward appeared in September.

"During the latter part of August, two specimens of *L. Lucia* were taken, unless they were the var. *violacea*. The markings on the underside of the wings were dark and heavy, exactly like those collected in the spring. It was not observed again."

The occurrence of *L. Lucia* or the form *violacea* in the month of August has never before been recorded, and it would seem at variance with the idea entertained of their being but spring forms. Mr. Scudder records that one example of *violacea* has been taken at Walpole, N. H., so late as the 7th of July, but it has ordinarily been confined, in this latitude, to the months of May and June.

Do not the observations of Dr. Howe of the August examples rather indicate that they were an exceptional second appearance of *L. Lucia*, and lend additional confirmation to the belief hitherto entertained of its being distinct from *L. pseudargiolus*.

Agrotis nigricans Linn., var. **maizii** Fitch.

Of this moth, figured and described at considerable length in Dr. Fitch's Ninth Annual Report (pl. 4, figs. 2 and 3, pp. 237–249, Sixth–Ninth Reports: 1865), there are five examples, labelled as above by Dr. Fitch, in the collection of the Museum of the New York State Agricultural Society, and bearing also the additional popular name of the corn dart moth.

No one else has recognized *A. nigricans* in any of our American forms, nor, very strangely, has this determination of Dr. Fitch been referred as a synonym to any other species.*

A critical examination of the examples above mentioned has enabled me to refer them unhesitatingly, although much faded from ten or more years' exposure to strong sunlight in an exposed table-case, to the typical form of *A. tessellata* Harris, as recognized in the collections at Buffalo and Albany. The specific name "*A. tessellata*" embraces at present a variety of forms, which seem to me to vary too much among themselves to really constitute a single species. I do not doubt but that, from these, other species will eventually be separated, and it is probable that ample material has already been accumulated for the purpose, in the two hundred or more "tessellata forms" in my possession which are awaiting a convenient time for their critical study.

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* Since the above has been in type, the reference of "*A. nigricans*" to the *A. tessellata* of Harris, made by Prof Grote in the *Canadian Entomologist*, vol. vi, 118 (1874), has come to my notice.

Agrotis perpolita *Morr.*

From a cursory inspection of the female of this species, it would probably be referred to *A. velleripennis*, with which it is compared in the original description. A closer examination, however, would disclose several points of difference, the more prominent of which are the following:

The head, wings and thorax are nearly black, having only a brown reflection: in *A. velleripennis*, although described as coal-black, they are of a dark brown shade in all the examples before me, some of which are quite fresh.

The usual transverse lines in velvety-black, which are distinctly to be seen in *A. velleripennis*, are in this entirely wanting. Its orbicular spot differs from the ordinary shape, in that it is elongated in the direction of the cell, and, in two of the three examples examined, pyriform in outline, having the contracted portion directed toward the base of the wing: in its elongation, it resembles that of *A. clandestina*, but the normal shape of the spot in that species is acutely ellipsoidal.

The legs and spines, which in *A. velleripennis* are distinctly annulated with pale scales, are much less conspicuously ringed in this.

The males of the two species — from the contrast presented in their secondaries — are not liable to be confounded; those of *A. velleripennis* being white, subhyaline, with a median line of nervular spots, more or less distinct, and a very narrow terminal bordering of brown, and in *A. perpolita* smoky brown, with a broad darker border. There is also a marked difference in their antennal structure — the serrations in the latter species being not half so long or so strong as in the former.

This species seems to be quite rare. The original specimen was from Orono, Maine. It was unknown to Prof. Grote, previous to his identification, from the published description, of the examples from Mr. Hill's collection. Three examples were taken by Mr. Hill at Center, N. Y., on August 16th, 30th and 31st. No other examples of it have occurred among the very large collections made at this locality.

Agrotis cupida Grote.*

A correspondent of the *Country Gentleman*, from Erie Co., O., has recently discovered the food-plant of the larva of this species. From his communication we obtain the following facts: In 1874, $200 worth of grape-buds were destroyed by some unseen enemy. Repeated and careful examinations for many days throughout the season failed to bring to light the depredator. The following year, upon examining the vine at night with a lantern, a caterpillar was seen crawling along the vine, and to stop at a bud and commence eating it. After this discovery, searches were made each night, by six or eight persons bearing lanterns, during the continuance of the caterpillar, and two thousand caterpillars were taken and destroyed. It was calculated, on the basis of one caterpillar eating a single bud in a night, that the buds destroyed by the two thousand which were killed, might have produced eight tons of grapes.

As one bud a night would be a very small allowance for a half-grown cut-worm, it would be safe, we think, to double the above estimate of possible resulting damages.

Nothing is stated of the appearance or habits of the larva, except that it is of the color of the vine, and commences its depredations as soon as the buds begin to start.

During my sugaring operations at Schenectady, larvæ were occasionally seen upon the grape-trellis at night, feeding upon the bait, but from my recollection of them, they had not the aspect of such of the Agrotis forms as I have seen.

A single example of the moth occurred among my collections at Schenectady, on the 7th of August, 1876. It had been a rare species in this vicinity, until the remarkable Center collections of 1877 made it a common form. It occurred abundantly at this locality during the latter part of August and through most of September.

Mr. George Norman (*Canadian Entomologist*, 7, p. 5) records it frequent at sugar, at St. Catharines, Ont., from 17th July to August. Mr. Westscott (op. cit., 8, p. 12), notes a single example at Maywood, Ill., on September 15. Mr. Thaxter, in his List (*Psyche*, II, p. 36), mentions it as rare, at light, in August.

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* *Noctua cupida* Grote: in Proc. Ent. Soc. Phila., vol. iii, p. 525, pl. 5, fig. 7. 1864.

Agrotis cupida Grote: in Trans. Amer. Ent Soc., vol. ii, p. 309. 1869.

A new grape-insect: The Cultivator and Country Gentleman, vol. xliii, p. 166. Albany, N. Y., March 14, 1878.

The moth is very variable in its features, in the color of its wings, form and coloring of its discal spots, etc., or different species are included under that name. The varieties which Mr. Grote has referred to this species, seem to me to differ too much to really constitute a single species. Another season's collections may enable us to determine the value of these differences.

Mr. Grote has referred, with some doubt, an Agrotis received from California, to this species.

Agrotis brunneicollis Grote. (*Noctua*) Proc. Ent. Soc. Phila., III, p. 524, pl. 5, f. 5. 1864.

This species has been captured for the first time in this district, by Mr. S. C. Waterman, at Ten Eyck's woods, near Albany, on the 15th of June, 1877. An example has also been taken at Kenwood during the same month. Mr. Thaxter records it among his Newton (Mass.) collections, as rather rare, at light, in August.

Cucullia intermedia Speyer.

Several examples of the larva of this species were taken at Center, N. Y., during the last of June and first of July, in their second, third and fourth stages, feeding on *Mulgedium leucophæum*, popularly known as false or blue lettuce.

The young larva is striped laterally and dorsally, and bears a strong resemblance to that of *C. lucifuga* in its early stages, as described by Dr. Speyer in the *Stettiner Entomologische Zeitung* for 1870, and in 23*rd Rep. St. Mus. Nat. Hist.*, p. 222.*

I regret that I have only the following brief notes of the appearance of the larva — a part of what was intended to be a detailed description. "The lateral stripe is white, of about one-third the diameter of the body, traversed by a yellow stripe of about one-half the breadth of the white, on which are the

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* To the kindness of Dr. Speyer I owe it, that the two specimens of the *lucifuga* larvæ prepared by Mr. O. Schreiner of Weimar, Prussia, from which his descriptions above referred to are drawn, have place in my collection. The specimens show the life-like appearance which may be imparted to larvæ when prepared by inflation (see Scudder in *American Naturalist*, vol. viii, p. 321), and also illustrate the service which they may render in the comparison of forms from widely separated localities and countries.

stigmata and a number of black spots, as follows: on the first segment, a black spot precedes the stigma; on segments 4–9 and 11, a black spot behind the stigma, bearing a black hair; on segments 4–9 each, on the white portion of the band, a larger, rounded black spot above, and a little in advance of, the stigma, having within it a longer black hair."

It is probable that the larva may again be found the coming season, to afford the means of completing the above description, which is quite desirable in consideration of its close resemblance to that of the European *C. lucifuga.* The mature forms taken at Center bore a closer resemblance to *C. lucifuga* than did my Schoharie examples. Dr. Speyer (*St. Mus. Rep.* ut cit., p. 222), in indicating the difference between the two, states "the first [*intermedia*] has thirteen dorsal spots, the other twenty-five." The examples collected as above, show that the number, shape and division of these spots are not constant, and that therefore, from such numerical or geometrical features, no reliable specific characters are to be drawn. I am able to recall my enumeration of eighteen dorsal orange spots on one of the larvæ.

In some notes on this larva, published by me in 1873, in the 23*rd Rep. St. Mus. Nat. Hist.*, p. 213, its probable food-plant is given as the common burdock (*Lappa officinalis*), as inferred from finding several examples near this plant, and some of the larvæ having fed upon it in confinement. I now incline to the belief that their eating the burdock was under the provocation of hunger, and that their range of food under natural conditions would not extend to a plant so different in character from that of the blue lettuce. It is an interesting fact that in its systematic arrangement, the genus Mulgedium stands between Lactuca and Sonchus, the two genera which embrace, in Europe, the food-plants of *C. lucifuga* (see loc. cit., p. 214). As two of these plants, *Sonchus oleraceus* and *S. arvensis* have been introduced in this country from Europe, and the former has become quite common around dwellings and by roadsides in New York, it is not improbable that the *C. intermedia* larva may hereafter be discovered upon them. I have repeatedly examined the burdock for the larvæ, but without success.

Xylina lambda (Fabr.), var. Thaxteri Grote.

The reference of *X. Thaxteri* as a variety of *X. lambda*, by Dr. Speyer, has been noted on page 120. From the examination of the photograph of *X. Thaxteri* given in the Grote Check List, Pt. ii, fig. 3, Dr. Speyer was led to express his opinion* that it was but a variety of the European *X. lambda*. Mr. Grote, in its description (*Bul. Buf. Soc. Nat. Sci.*, ii, p. 196), had instituted a comparison between it and *Zinckenii*, under which name *X. lambda* was formerly known.

The recent examination by Dr. Speyer of a number of examples of *X. Thaxteri* has confirmed the opinion above expressed. He finds it to "correspond with the European species in all particulars except in that its primaries are a little broader, and its secondaries somewhat more excavated on vein 5. *X. lambda* had heretofore been known under three varieties ; *Zinckenii* Treits., *rufescens* Mén., and *somniculosa* Hering. *Thaxteri* is now the fourth well marked variety ; in its sharp markings, it resembles *Zinckenii* var., and in its color, *rufescens* var."

Hypena humuli Fitch.

In Harris' *Report on the Insects of Massachusetts*, p. 345 (Edition of 1841), the author, after describing some caterpillars infesting the hop-vine, says of the moths proceeding from them, that "they have been named [by him] the *Hypena humuli*, on the supposition that they are distinct from the *Hypena rostralis* or hop-vine snout-moth of Europe."

"These moths are readily known by their long, wide, and flattened feelers, which are held close together, and project horizontally from the fore part of the head in the manner of a snout. The antennæ in both sexes are naked and bristle-formed. The wings vary in color, being sometimes dusky or blackish brown, and sometimes of a much lighter rusty brown color. The fore-wings are marbled with gray beyond the middle, and have a distinct oblique gray spot on the tip ; they are crossed by two wavy blackish lines, one near the middle, and the other near the outer hind margin ; these lines are formed by little elevated black tufts, and there are also two similar tufts on the middle of the wing. The hind wings are dusky brown or light brown, with a paler fringe, and are without bands or spots. The wings expand about one inch and a quarter."

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* Stettiner Entomologische Zeitung, for 1876, page 203.

The above description is inapplicable to the *Hypena humuli* of our collections; it applies fully to *Hypena scabra* Linn., and to no other species with which we are acquainted. In *H. scabra*, the fore-wings are marbled with gray beyond the middle" — in *H. humuli*, not: "the two wavy blackish lines, one near the middle, and the other near the outer hind margin, are formed by little elevated black tufts;" in *humuli* these lines do not consist of elevated scales or tufts, even in examples just emerged from pupæ. The "two similar tufts on the middle of the wing" of *scabra*, are replaced in *humuli* by four. Of the former species, "the wings expand one inch and a quarter;" of the latter, no specimen of large numbers under my observation, have equaled that expanse.

From the above it seems evident that the description of Harris was drawn from examples of *H. scabra* before him: from the general resemblance of the two species, *scabra* examples may have accidentally replaced those which he had reared from the hop, and which he intended to describe.

An earlier reference to the species is made by Harris in his *Catalogues of the Animals and Plants of Massachusetts*, 1835, page 74, where it is included among the Tineidæ as *Crambus humuli*.

The description of "*Hypena humuli*" is also given in the subsequent editions of Dr. Harris' Report.*

In 1855, in the *Transactions of the N. Y. State Agricultural Society*, vol. xv, pp. 555–558, pl. 1 fig., 1, Dr. Fitch describes and figures the moth obtained from the hop-vine larvæ as the *Hypena humuli* of Harris, in the event of its not proving identical with the European *H. rostralis* L. This being the first description of the species, the name of Dr. Fitch will hereafter have to be associated with it. The above is also to be found in the volume of the *First and Second Report on the Noxious Insects of New York*, pp. 323–326, pl. 1, fig. 1, printed in 1856.

In the *Annals of the Lyceum of Natural History of New York*, ix, p. 311 (1870), Mr. Coleman T. Robinson describes a form as *Hypena evanidalis*. This form proves to be the female of *H. humuli* — the sexes differing so much that for a long time they were regarded as distinct species.

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* Insects of New England Injurious to Vegetation, p. 373. 1852. Insects Injurious to Vegetation, p. 477, f. 273. 1862.

Depressaria Le Contella Clem., etc.

Through some misunderstanding, the captures of the following named species, which were added to the proof of the short list of Microlepidoptera given on p. 51 of these papers, were omitted in the printing:

Depressaria Le Contella *Clem*	Aug. 10
Acrobasis nebulo (*Walsh*)	July 8
Tortrix furvana *Rob*	June 27
Tortrix limitata *Rob.*	July 10
Tortrix Pettitana *Gr.-Rob*	July 1
Sericoris campestrana *Zeller*	June 19
Ditula blandana *Clem.*	June 26

The following species of New York Tortricidæ have also been taken by me, at the date stated, but were not captured at sugar, as were the preceding species. With a few exceptions they were collected at Schoharie, Schenectady and Center. Most of the determinations were made for me by Prof. Fernald:

Tortrix gurgitana *Rob*	July 14
furvidana *Clem*	July 15
fumosa *Rob*	July 4
discopunctana *Clem*	June 30
incertana *Clem*	July 18
lævigana *S.-V.*	June 15
nigridia *Rob*	June 21
puritana *Rob*	Aug. 5
sulfureana *Clem*	Aug. 21
Penthina albeolana *Zell*	June 18
chionosema *Zell*	June 13
nimbatana *Clem*	Aug. 18
Steganoptycha flavocellana *Clem*	Aug. 15
Phoxopteris mediofasciana *Clem*	May 16
nubeculana *Clem*	June 10
spireæfoliana *Clem*	June 13
Pædisca dorsisignatana *Clem.*	Sept. 14
otiosana *Clem*	July 12
Sericoris coruscana *Clem*	June 12
constellatana *Zell*	June 18
Exartema fasciatanum *Clem*	July 30

XXVII. ON SOME SPECIES OF COSSUS.

Cossus reticulatus n. sp.

Allied to *C. robiniæ* in shape of wings and markings, having the stronger scales and reticulated ornamentation of that species, in which it differs from the minute and sparse scales and transverse lines of *C. querciperda* and *C. Centerensis.*

Primaries reticulated with black on a pale ash ground, the wings lighter than n *C. robiniæ*, from the absence of the conspicuous intranervular black spots and streaks which characterise that species, and are well represented in fig. 205, p. 413, of Harris' *Insects Injurious to Vegetation.* In this species, only between the internal, submedian and 1st median nervule (veins 1a, 1b, and 2), at the outer third of the wing, do the reticulations coalesce so as almost to form spots. In the terminal and subterminal portions of the wing, the small ash spots (sometimes ocellated with a black dot or line) for the greater part rest upon the veins; between 2 and 5, there are other spots intermediate to these venular ones — elsewhere, with a few exceptions, the spots are venular, forming two intranervular rows. The costal region is pale ash, traversed by black lines rather than reticulated. The median portion of the wing is imperfectly reticulated. The terminal margin, and the unicolorous fringe is conspicuously marked with a black spot on each vein.

Secondaries thinly clothed with fuscous hairs, permitting the reticulations of the lower surface to be seen in transparency, except between the margin and costal nerve, where it is scaled in pale ash as the primaries. Terminal margin and the pale fringe, black spotted as the primaries.

Beneath: primaries much as above, with these differences: There is an accumulation of blackish elongated scales in the basilar region, in the interspaces of the internal, submedian and median nerves; also between veins 2 and 3 at their origin, and a triangular spot having its apex on the costa at its outer third. Costa with about fourteen black lines between the base and vein 12, and three lines between veins 12 and 11, of which the outer, at the junction of vein 11 with the costa, is broad and extends inwardly to vein 10 ; another broad, black costal line each at the junction of veins 10 and 9 with the costa — these last three spots (also shown on the upper surface of the wings) are the equivalents of the three anteapical costal white dots of many of the Noctuidæ, designated by Guenée as the virgular spots (*traits virgulaires*).

Secondaries, from inner margin to vein 1 b, clothed with fuscous hairs as above ; thence to costal margin with ash scales, nearly plain between 1b. and 2 ; reticulated between the median nervules (veins 2–5) and to vein 7 as on the primaries above ; thence to costal margin, the interspaces barred by black lines, of which about eighteen are seen on the margin. A fuscous cloud borders the median nerve from the base to within its branches. Thorax above and beneath covered with pale ash scales. Tibiæ and tarsi ash, annulated with black. Abdomen above, apparently (the body of the example is much greased) concolorous with the secondaries above. Antennæ black, strongly bipectinate, like those in *C. robiniæ*.

Expanse of wings, 3.35 inches; length of body, 1.75 inch.

Habitat, etc., Texas, Rio Grande. Described from one female, in the collection of Mr. B. Neumœgen, New York city

Cossus undosus n. sp.

A Cossus was taken by Mr. S. H. Scudder, at Green River Station, Union Pacific Railroad, Wyoming, resting on a "cotton-wood" (*Populus balsamifera*, probably), together with a pupa case projecting from the same trunk. Through the kindness of Mr. Scudder, these have been placed in my possession. The moth unfortunately is a wreck, in no condition for accurate description, having lost its antennæ, one-half of one pair of wings, and one-third (the apical portion) of the other.

It differs from any of our known species in markings and squammation. Both pair of wings in their ground color are white, and are crossed by numerous, narrow, black, transverse lines. Of these the most prominent one crosses the outer third of the cell, with an outward inflection from the costa to the subcostal nervure, an inward inflection in the cell to the first median nervule which it follows for a short distance, and thence proceeds in a double curve to the internal margin. Another black line, less heavily marked, runs irregularly from the costa to the internal margin, passing over the middle of the cell. Between the stronger transverse lines are fainter ones, which sometimes reticulate with the former. The thorax, abdomen, basal and internal portion of the hind wings, are thickly clothed with pale gray hairs or elongated scales: the remaining portion of the hind wings (the portion preserved in the example) is as thickly scaled as the primaries, and nearly as distinctly lined; beneath they are stronger lined than above. Palpi barely extending beyond the eyes, clothed with white scales interspersed with narrow black ones. Thorax beneath, with long gray hairs. Legs similarly clothed, with their tibiæ and tarsi banded with black.

Length of body, with extruded ovipositor, 1.50 inch. Expanse of wings, entire, unknown; from one discal cross-vein to the opposite, 1.85 inch.

The pupa-case projecting from the tree, was that of a moth differing in sex from the captured example, but presumably of the same species. It measures 1.40 in. in length and 0.3 in. in its broadest diameter. Its color is about that of the ♀ of *C. robiniæ*, but of a paler brown than the ♂ of that species. Its terminal segment and rows of teeth on the segments are darker brown, approaching fuscous, but presenting quite a contrast with the black terminal segment and wing-cases of *C. Centerensis.* Its armature (transverse rows of teeth) is much stronger than in the ♀ *C. robiniæ*, and a little more so than in the ♂. It is stronger than in *C. Centerensis* (in which the armature is nearly equal in the sexes), having the teeth longer, although not so broad at their base: on the 8th, 9th and 10th segments, the teeth continue quite prominent in their extension below the stigmata, where in *C. Centerensis* they are weak.

The armature of the pupa-cases of Cossus, unquestionably presents excellent specific characters. From its study, I am able to announce the existence, in the State of New York, of another species of Cossus, boring in the white birch (*Betula populifolia*), the imago of which has not yet been detected.

From near the base of a prostrate birch at Center which had been extensively mined, I took, in 1876, a pupa-case, clearly differing from any known species. Unfortunately the specimen has been mislaid, or I should not hesitate, from the characters it presented to describe it and give the species a name. Other trunks of birch have been observed by me, similarly mined, and evidently by the same Cossus.

The species above described as *Cossus undosus*, may possibly be the *C. populi* of Walker (*Cat. Lep. Br. Mus.*, vii, p. 1515), from Hudson's Bay, which has not yet been identified. The very general terms in which its brief description is given, will not admit of its separation from allied forms, and unless the type is preserved in the British Museum, and comparison be made, it must be handed over to the long list of undetermined and indeterminable species of Walker.

It cannot be the *Cossus nanus* of Strecker, from its non-resemblance to *Cossus ligniperdi*, which *C. nanus* is said closely to resemble*; and from its differing markedly from a Colorado example of a ♀ Cossus which I refer to the ♂ *named* by Mr. Strecker but unfortunately accompanied by the mention of only a few specific features.

Cossus plagiatus Walker.

This species, briefly indicated, loc. cit., p. 1515 (1856), is another unknown species. Mr. Grote in his *List of the North American Platypterices, Attaci*, etc., p. 8 (1874),† refers it as a synonym of *Mac Murtrei* (Boisd.), Icon. Règne An., pl. 85, f. 2,—marking it, however, as an unrecognized species. It does not appear why this reference is made, and we may presume that it is based on a citation of Dr. Packard, in his *Synopsis of the Bombycidæ of the United States*,‡ where under the synonymy of *Xyleutes plagiatus*, he quotes from the *Systematic List of Canadian Lepidoptera* by W. S. M. D'Urban, § the following :

**Cossus nanus* n. sp.—Expands 1¼ inches. Has the appearance of a minature *Cossus ligniperda*, is gray, of lighter and darker shades, and reticulated with black lines which are most noticeable across the disk and on the terminal part of wing. Secondaries uniform grayish. Beneath grayish, faintly reticulated.—Hab. Colorado. Proc. Acad. Nat. Sci. Phila., 1876. p. 151.

† Read before the American Philosophical Society, Nov. 20th, 1874.

‡ Proc. Ent. Soc. Phila., vol. iii, p. 390. 1864.

§ Can. Nat. and Geol., Aug. 1860, p. 247

"*Cossus plagiatus* Walk. Rare, July.

"In 1857, Mr. T. R. Peale, of the U. S. Patent Office, named this species *Cossus McMurtrici* [sic], and informed me that it was common south of Pennsylvania, but rare in the Middle States."

Cossus crepera Harris.

This name appears in Dr. Harris' *Catalogues of Animals and Plants of Massachusetts*, p. 72. 1835, but is not continued in his subsequent reports. In 1839, Doubleday, having suspected its true relationship, writes to Dr. Harris of this species: "There is a true *Cossus* with mottled upper wings, and yellow under wings, black at the base and inner margin; —*Robiniæ* ♂?" It is decribed by Dr. Packard, loc. cit., p. 388, as *Xyleutes crepera*, and catalogued by Grote in his List above cited, as an unrecognized species, under the new generic name proposed by him of Xystus. It is now known to be but the ♂ form of *C. robiniæ*, from the ♀ of which it differs so greatly in the angulated form of its posterior wings and their yellow color, as to have been mistaken for another species.

Cossus querciperda Fitch.

The species described under this name by Dr. Packard, loc. cit., p. 389, is not the one so named and briefly described by Dr. Fitch,* but some other form — possibly *C. Centerensis*.† The types are the only pair, so far as known, in existence, and are in my Collection. A male and female were taken in copulation, June 27, 1857, at Schoharie, on the trunk of a young black oak (*Quercus tinctoria*), four inches in diameter. A second male was taken at the time, from the same tree, a short distance from the attached pair. One of these, together with the female, it is believed, were subsequently given to Mr. J. W. Weidemeyer, of New York, with other duplicates from my boxes, without statement of their rarity, which at the time was not known. As Mr. Weidemeyer's Collection is no longer in his hands, the examples have probably been destroyed.

In March following the capture of the above examples, two Cossus larvæ were found in burrows in some pieces of black oak which had been prepared for fuel. They were both frozen rigidly when discovered. One was lying in a cell, in its burrow, formed by some slight threads in which its cuttings had been thinly woven above and below it: the other had constructed a cell ot about the capacity of its body, branching off from its main burrow—its entrance closed by a thin wall of the cuttings.

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* Trans. N. Y. State Agricul. Soc., vol. xviii, p. 790. 1859. Fifth Report of the Insects of New York, p. 10 (section 294 of the volume of the Third, Fourth and Fifth Reports).

† Canadian Entomologist, vol. ix, p. 129. 1877.

The smaller of the two larvæ measured one inch and a half in length. It was of a pale green color, with a darker green dorsal stripe, bordered faintly with yellow. Head flat, subtriangular, dark brown, clouded with black. First segment with two brown spots extending across it, narrowed laterally, and of nearly the length of the segment medially, where they unite to inclose on the dorsal line an elongate-elliptical green spot. The anterior segments are flattened, and broader than the following, which gradually diminish in breadth toward the posterior end. The segments are marked dorsally with four rose-colored elevated points — the trapezoidal spots of Guenée; on the 10th and 11th segments they form a square: a similar spot is present above each stigma, a smaller one below, and another in front—each of these bearing a short brown hair. The stigmata are oval, orange colored, centered with dark brown. The legs are tipped with chestnut brown, and the prolegs armed with brown plantæ.

One of the larvæ escaped from its burrow by gnawing through the stick of wood in which it was inclosed and its paper box, and was found some weeks thereafter, dead within a roll of clothing. The other disclosed a perfect imago on the 29th of April—the female type of the rare *C. querciperda* of my Collection. The larva had constructed within its burrow a very slight cocoon of delicate silk. The long ovipositor of the moth was a marked feature of it, when alive, measuring in its full extrusion, three-tenths of an inch. It displayed a tenacity of life remarkable even in a gravid Bombycid, as it lived for twenty-four hours after a strong solution of cyanide of potassium had been pricked in its thorax.

The most interesting character of this species is not referred to in its description, viz.: the great disparity in the size of the sexes. The ♂ measures in length of body 0.55 in., and in expanse of wings, 1.23 in. The body of the ♀, exclusive of its ovipositor, is 1.25 in. long, and the expanse of wings is 2.62 in. Their comparative weight is as one to four, even after the removal of the eggs and viscera from the female—its weight being twelve grains, and that of the male three grains. Were it not for the capture of a second male at the same time. of the same diminutive size, it might have been supposed that the example was a dwarfed individual. This disproportion in size is the more interesting, from the fact that in a congeneric species—*Cossus Centerensis*, the size affords no indication of sex, for the males of this species are often larger than the females.

Dr. Fitch has erred in representing the hind wings of the male *querciperda* as colorless. They are pale yellow on the disc beyond the fold at vein 1a—the color of the delicate scales showing more plainly when their surface is viewed in line with the eye. Within vein 1a to the inner margin, the wing is covered with black hairs.

The yellow coloring of these wings, together with the angle on vein 1, and the antennal structure, ally this species to *C. robiniæ*.

INDEX TO ENTOMOLOGICAL CONTRIBUTIONS.

Page.
Abrostola ovalis 120
Achatodes zeæ 34
Acidalia enucleata 36
  inductata 36
  lacteola 112
  quadrilineata 36
Aciptilia alternaria 53
Acrobasis nebulo 129
Acronycta albarufa 120
  Americana 33, 44
  brumosa 33
  dactylina 120
  dentata 33
  dissecta 44
  exilis 120
  grisea 120
  hamamelis 33
  lepusculina 33
  lithospila 120
  lobeliæ 33, 120
  luteiocoma 120
  occidentalis 44
  ovata 120
  Radcliffei 33, 120
  subochrea 120
  superans 33
  tritona 120
  vinnula 44
Ægeria tipuliformis 22
Agrotis albipennis 120
  alternata 45, 49
  annexa 45
  astricta 34, 40
  badicollis 44, 120
  baja 33
  bicarnea 33, 44
  Bostoniensis 120
  brunneicollis 125
  Chardinyi 33, 40
  c-nigrum 44, 49
  conflua 33, 40, 41
  cupida 120, 124
  dilucida 120
  fumalis 120
  gilvipennis 40
  haruspica 33, 44
  herbida 45

Page.
Agrotis herilis 33, 45
  Hilliana 120
  janualis 120
  messoria 45, 49
  mimallonis 120
  murænula 33, 45
  nigricans v. maizii 122
  Normaniana 33
  occulta 45
  opacifrons 120
  perattenta 33
  perconflua 33, 40
  perpolita 120, 123
  phyllophora 120
  pitychrous 33, 45, 49
  placida 33
  plecta 33, 45
  prasina 34
  pressa 34, 120
  redimicula 33
  rufipectus 33, 40
  saucia 45, 53
  sexatilis 45
  sigmoides 33, 44
  subgothica 33, 44
  tessellata 122
  tricosa 33, 45
  turris 34
  velleripennis 45, 123
  venerabilis 45
  ypsilon 33, 45, 49, 52, 53
Amblyscirtes vialis 72
Amphipyra pyramidoides 35, 46, 50
  tragopogonis 35, 46
Ancyloxypha Numitor 71
Angerona crocataria 36
Anthrenus lepidus 16
  musæorum 19
  scrophulariæ 15–23
  varius 19, 20, 21
Anytus sculptus 35, 47, 49
Arctia Saundersii 22
  virgo 32
Argynnis Aphrodite 31
  Atlantis 31
  Bellona 31
  Cybele 31

Page.

- Argynnis Idalia, 118
  - montinus, 30
  - Myrina, 31
- Asopia devialis, 37
  - farinalis, 37, 52, 53
  - squamealis, 37
- Aspidiotus conchiformis, 22
- Aspilates Lintneraria, 37

- Blatta orientalis, 22
- Bleptina caradrinalis, 36
- Boarmia humaria, 36
- Boarmia pampinaria, 36
- *Bombyx* dictæa, 76
- *Bombyx tremula*, 76
- Bomolocha abalienalis, 48
- Botis badipennis, 38
  - generosa, 38
  - hircinalis, 38
  - marculenta, 37
  - plectilis, 37
  - subolivalis, 38
  - theseasalis, 37
- Brephos infans, 90, 115–117
  - Middendorfii, 115
  - *notha*, 115
  - Parthenias, 115
  - puella, 115
  - vidua, 115
- Briophila lepidula, 33
- Brotolomia iris, 34

- Cabera erythemaria, 36
  - variolaria, 36
- Callidryas Eubule, 53
- Callimorpha militaris, 32
- Calocampa cineritia, 120
  - curvimacula, 120
  - nupera, 120
- Caradrina bilunata, 120
  - *blanda*, 90
  - *Callisto*, 89
  - cubicularis, 89, 91, 92
  - fidicularia, 35, 89–92
  - *leucoptera*, 90
  - multifera, 89, 91
  - *quadripunctata*, 89
  - *segetum*, 89
  - *superstes*, 90
- Caripeta divisaria, 37
- Carpocapsa pomonella, 5, 22
- Carterocephalus argyrostigma, 73
  - Palæmon, 71, 73
  - Silvius, 73
- Catocala amatrix, 48
  - antinympha, 48, 49
  - Briseis, 47, 49, 51
  - cara, 48, 51
  - cerogama, 48
  - Clintonii, 48
  - coccinata, 119
  - concumbens, 48
  - cratægi, 100, 102
  - Epione, 119
  - flebilis, 119

Page.

- Catocala fratercula, 102
  - gracilis, 48, 49
  - habilis, 48
  - Ilia, 35, 47
  - Meskei, 47
  - minuta, 120
  - neogama, 48, 51
  - nuptula, 48, 51
  - parta, 47, 50, 51
  - polygama, 35, 48, 100, 102
  - præclara, 35, 102
  - pretiosa, 48, 100–102
  - Robinsoni, 119
  - serena, 48
  - tristis, 120
  - ultronia, 35, 47, 50, 51
- Catodaulis Tethys, 74
- Cecidomyia destructor, 22
- Cerura aquilonaris, 82, 83, 85
  - bicuspis, 85
  - bifida, 82
  - borealis, 83, 84, 86
  - candida, 87
  - cinerea, 83, 85, 86
  - furcula, 83, 84
  - multiscripta, 86, 87
  - occidentalis, 82
  - scitiscripta, 87, 88
- Chamyris cerintha, 47, 48
- Charadra propinquilinea, 120
- Chionobas semidea, 30
- Chœrocampa tersa, 119
- Chœrodes transversata, 36
- Chrysophanus Americana, 32
  - Thoe, 32
- Cidaria albolineata, 37, 40
  - cunigerata, 37, 39
  - hersiliata, 37, 39
  - Packardata, 37, 39, 40, 113
  - populata, 113, 114
  - testata, 37
  - truncata, 37, 39
- Clanyma angulalis, 48
- Clisiocampa Americana, 33
- Cœlodasys unicornis, 33
- Colias Philodice, 31
- Condylopeza nigrinodis, 51
- Conservula anodonta, 120
- Copæodes minima, 71
  - Waco, 71
- Coremia designata, 37
  - ferrugaria, 37, 39
- Cosmia infumata, 47, 49
- Cossus Centerensis, 132, 134, 136
  - *crepera*, 134
  - ligniperda, 133
  - Mac Murtrei, 133
  - nanus, 133
  - plagiatus, 133
  - populi, 133
  - querciperda, 134
  - reticulatus, 130
  - robiniæ, 130, 132, 134
  - undosus, 131
- Crambodes talidiformis, 47

Page.

- Crambus girardellus 38
  - præfectellus 38
- Crioceris asparagi 22
- Crocigrapha Normani 120
- Crocota ferruginosa 33
- Ctenucha virginica 32
- Cucullia absynthii 99
  - asteris 99
  - asteroides 35, 99
  - convexipennis 35
  - intermedia 35, 99, 125
  - lætifica 99
  - lucifuga 125, 126
  - postera 35, 99
  - Speyeri 98, 99
- Cyclopides Morpheus 71, 73
  - ornatus 73
  - *Silvius* 71
  - *Steropes* 71, 73

- Danais Archippus 31, 53
- Daremma undulosa 32
- Depressaria atrodorsella 51
  - Fernaldella 51
  - Le Coutella 129
  - pulvipurella 51
- Desmia maculalis 37
- Dianthœcia lustralis 34, 40
  - modesta 120
- Dicranura borealis 84
- Diphthera fallax 33, 120
- Diplosis tritici 22
- Dipterygia pinastri 46
- Ditula blandana 38, 129
- Doryophora decemlineata 22
- Drasteria erechtea 35, 47
- Dryobata stigmata 120
- Dryopteris rosea 33

- Ectobia germanica 22
- *Electra* populata 114
- Ellopia fiscellaria 36
- Eudropia bilinearia 36
  - effectaria 36
  - serrata 36
- Ennomos alniaria 36
  - magnaria 36
- Ennychia octomaculalis 37
- Ephestia interpunctella 53
- Ephyra pendulinaria 36
- Epizeuxis æmulalis 35, 48
  - americalis 36
- Erastria albidula 35
  - carneola 35, 47, 50
  - muscosula 35
  - nigritula 47
  - synochites 47
- Erebus odora 53
- Eriopus mollissima 34
- Euchætes Oregonensis 118
- Eucirrœdia pampina 35, 47
- Eudamus Bathyllus 69, 72
  - Cellus 72
  - Epigena 69
  - Lycidas 69, 72, 118

Page.

- Eudamus *Orestes* 69, 70
  - Proteus 72
  - Pylades 32, 72
  - Tityrus 69, 72
- Eufitchia ribearia 37
- Eumacaria brunnearia 36
- Euparthenos nubilis 47
- Eupithecia miserulata 37
- Euplexia lucipara 34, 46
- Eustrongylus papillosus 11
- Exartema fasciatanum 129
  - permundanum 51

- Filaria anhingæ 11
  - boæ constrictoris 13
  - canis cordis 13
  - hominis oris 12
  - Mendinensis 12

- Galleria cereana 22, 38
- Glæa apiata 120
  - pastillicans 120
  - tremula 120
  - venustula 120
- Gordius aquaticus 14
- Gortyna appassionata 120
  - nebris 120
  - nictitans 46, 51
  - purpurifascia 120
  - sera 46, 51
- Grapta comma 31
  - Faunus 31
  - j-album 31
  - Satyrus 121

- Habrosyne scripta 44
- Hadena adusta 14
  - algeus 120
  - apamiformis 34, 46
  - arctica 34, 46, 49, 51
  - arna 120
  - devastatrix 34, 45, 49, 51
  - Hillii 34, 40
  - impulsa 34, 45
  - lateritia 34
  - leucoscelis 120
  - lignicolor 34, 46, 49, 51
  - loculata 34, 45
  - modica 34, 46
  - sectilis 34, 46
  - sputatrix 34, 45, 49, 51
  - suffusca 46
  - verbascoides 34, 46
- Hæmatopis grataria 37
- Heliothis armiger 52, 53
- *Hesperia*, see Pamphila, Pyrgus, etc. 73, 74
- Heterophleps triguttata 37
- Homohadena badistriga 93
- Homoptera benesignata 120
  - *Edusa* 108, 109
  - lunata 48, 108, 109
  - obliqua 120
  - Saundersii 108
  - unilineata 120

Page.
Homoptera Woodii.............. 120
Homopyralis tactus.......35, 48, 50, 51
Hydrœcia sera.................. 34
Hypena humuli............36, 48, 127
    scabra.................... 128
Hypocala filicornis............. 106
    Hilli..............103–107, 120
    Pierreti.................. 106
Hyppa xylinoides........31, 46, 50, 51

Isosoma hordei.................. 25
    vitis....................21–28

Laphygma frugiperda............. 46
Larentia cæsiata..........37, 39, 40
    flavicinctata.............. 40
    infrequentata.............. 40
Leiocampa dictæa................ 76
Leptosia concinnimacula.......... 35
Leucania adonea...............34, 46
    commoides................34, 46
    extranea................... 53
    Harveyi................... 34
    lapidaria................34, 46
    pallens..................34, 46
    phragmitidicola..........34, 46
    pseudargyria.............. 46
    unipuncta........35, 46, 50, 53
Limenitis Arthemis............32, 38
    disippus.................. 32
Lithacodia bellicula............. 35
Lithomia germana................ 120
Litognatha nubilifascia.......... 36
Lobophora geminata.............. 117
Luperina reniformis...........46, 50
    ren. v. atra.............. 46
Lycæna comyntas................. 56
    Lotis..................... 57
    Lucia................55, 56, 121
    neglecta.........32, 55, 56, 121
    pseudargiolus...........55, 121
    Scudderii................. 57
    violacea................55, 122
Lycomorpha pholus............... 32
Lygranthœcia brevis............. 120

Macaria enotata................. 37
    granitata................. 37
Mamestra adjuncta............... 45
    albifusa.................. 45
    assimilis................. 120
    chenopodii................ 45
    congermana................ 120
    Godelli................... 45
    imbrifera................. 34
    latex..................... 45
    legitima.................. 34
    lilacina.................. 120
    lorea....................34, 45
    lubens.................... 120
    nimbosa..................34, 45
    olivacea.................34, 45
    purpurissata.............. 34
    renigera.............34, 45, 49
    subjuncta................34, 45

Page.
Mamestra trifolii............... 34
    vindemialis............... 120
Melanippe basaliata............. 37
    fluctuata................39, 40
    hastata..................37, 39
    lacustrata................ 37
    ruficillata............... 37
    sociata................... 37
Melitæa Phaeton................. 31
Mermis acuminata...............5–12
    albicans..................7, 14
Microcœlia diphteroides.......... 33
    fragilis.................. 33
    obliterata................ 33
Morrisonia evicta............... 120
    vomerina.................. 120
Musca domestica...............13, 22

Nadata gibbosa.................. 32
Nematocampa filamentaria........ 36
Nematus ventricosus............. 22
Neonympha Canthus............... 32
    Eurytris.................. 32
Nephelodes minians.............. 119
    violans...........34, 46, 49, 119
Nisoniades Afranius............. 63
    Ausonius.................63, 64
    Brizo............62, 63, 64, 72
    funeralis................61, 62
    Icelus...............62, 64, 72
    Juvenalis................65, 72
    Lucilius.............67, 68, 72
    Martialis........60, 63, 64, 65, 72
    montanus.................. 74
    Pacuvius.................. 60
    Persius..........60, 63, 65, 72
    Petronius................. 64
    Rutilius.................. 64
    Tages....................72, 74
    tristis..........61, 62, 63, 72
Nolaphana Zelleri............... 35
Nomophila hybridalis............ 53
Notodonta *Californica*.........76, 81
    dictæa...................76–81
    tremula................... 76

Odezia albovittata.............. 37
Ophiusa bistriaris.............. 47
Oporabia cambricaria......37, 39, 40
    12-lineata................ 37
Orgyia nova..................... 32
Orthodes candens................ 46
    infirma..................35, 46
Orthosia euroa.................. 120
    ferrugineoides.....47, 50, 51, 90
    helva....................47, 50

Pædisca dorsosignata............ 129
    otiosana.................. 129
Palthis angulalis............... 36
Pamphila Ætna.................72, 73
    Ahaton..................... 72
    Alcides................... 73
    bimacula.................. 72
    Brettus................... 71

Page.
Pamphila Cernes 32, 72
  comma 71, 73
  conspicua 72
  Hianna 72
  Hobomok 71
  Huron 71
  Inachus 73
  Iowa 72
  Leonardus 32, 71
  Manataaqua 72
  Massasoit 71
  Mathias 73
  Metacomet 32, 59, 72
  Metea 71
  Mystic 32, 72
  nostrodamus 73
  ochracea 73
  Osceola 58
  Osyka 72
  Peckius 32, 72
  Phylæus 53, 71
  Sassacus 71
  Sylvanus 71, 73
  verna 72
  Vitellius 72
  Zabulon 32, 71
  Zelleri 73
Pangrapta decoralis 35
Papilio species, see 73, 74
Papilio Turnus 31
Paraphia subatomaria 36
Parorgyia Clintonii 32
Penthina albeolana 129
  chionosema 129
  nimbatana 129
Perigea luxa 46
Phasiane mellistrigata 37
  trifasciata 37
Pheosia rimosa 76
Philampelus labruscæ 53
  vitis 53
Philometra longilabris 36
  serraticornis 48
Phlogophora Iris 46
  periculosa 34
  v-brunneum 120
Pholisora Catullus 61, 72, 118
  Hayhurstii 72
Phoxopteris mediofasciana 129
  nubeculana 129
  spireæfoliana 129
Phyciodes Batesii 31, 118
  Nycteis 31
  tharos 31
Pieris oleracea 31, 67
  rapæ 22, 31
Piophila casei 22
Placodes cinereola 47
Plagiomimicus pityochromus 47
Plastenis pleonectusa 35, 47
Plathypena scabra 48
Plusia æroides 35
  ampla 35
  balluca 35

Page.
Plusia bimaculata 35, 40
  epigæa 35, 40
  formosa 120
  mortuorum 35, 40
  precationis 35
  Putnami 35, 90
  simplex 35
  u-aureum 35, 40
Plutella cruciferarum 22, 53
  xylostella 53
Polia diffusilis 120
Pseudaglossa lubricalis 35, 48
Pseudothyatira cymatophoroides 33, 44
  expultrix 33, 44, 50
Pterophorus leucodactylus 53
Pyrameis Atalanta 32
  Carye 53, 54
  huntera 32, 53
  huntera v. Iole 53
Pyrgus Alceæ 72, 74
  Althææ 72, 74
  Alth. v. Bæticus 74
  alveolus 72
  alveus 72
  andromedæ 72
  cacaliæ 72
  carthami 72
  centaureæ 72
  cribellum 74
  floccifera 74
  Inachus 73
  lavateræ 72, 74
  malvæ 72
  malvarum 72, 74
  montanus 74
  orbifer 72, 74
  phlomidis 74
  Poggei 74
  proto 72, 74
  Sao 72, 74
  serratulæ 72
  Sertorius 72
  tessellata 72
  tessellum 74
  tess. v. Nomas 74
  Tethys 74
Pyrrhia angulata 47

Renia Belfragei 36, 48
  centralis 48
  discoloralis 36
  lævigata 48
Rivula propinqualis 36

Satyrus Alope 32
  Nephele 32
Scelothrix alveus 74
  alv. v. carlinæ 74
  alv. v. cirsii 74
  alv. v. fritillum 74
  andromedæ 74
  cacaliæ 74
  carthami 74
  centaureæ 74

Page
Scelothrix cirsii 74
  cynaræ 74
  maculata 74
  malvæ 74
  mal. v. malotis 74
  mal. ab. Taras 74
  serratulæ 74
  ser. v. cæca 74
  sidæ 74
Scoliopteryx libatrix 47
Scoparia centurialis 38
Scopelosoma ceromatica 120
  devia 120
  Græfiana 120
  tristigmata 120
  vinulenta 120
Scotosia undulata 37
Segetia fidicularia 89
Sericoris cæsialbana 38
  campestrana 129
  constellatana 129
  coruscana 129
Sesia uniformis 32
Sicya truncataria 36
Sitophilus granarius 22
Smerinthus geminatus 32
Sparganía magnoliata 37, 39, 40
Sphinx luscitiosa 118
Spilosoma latipennis 119
  textor 32
Stegania pustularia 36
Steganoptycha flavocellana 129
Steropes argyrostigma 73
Synchlora rubivoraria 36
Syrichtus andromedæ 74
Syrichtus maculatus 74

Tæniocampa oviduca 35, 47
Tæniosea gentilis 35
  perbellis 35
Tenebrio molitor 22
Thamnonoma brunneata 37, 39
  pinitaria 39
Thanaos Marloyi 74
Thecla strigosa 32
  Titus 32
Thyatira pudens 120
  scripta 33
Thymele Epigena 69
Thymelicus Actæon 71, 73
  Hyrax 73
  lineola 71, 73
  Thaumas 71, 73
Tinea pelionella 22
  tapetzella 15, 22

Page.
Tinea vestianella 22
  zeæ 53
Tortricodes bifidalis 48, 110, 111
  indivisalis 110, 111
Tortrix cerasivorana 38
  discopunctana 129
  fumosa 129
  furvana 129
  furvidana 129
  gurgitana 129
  incertana 129
  lævigana 129
  limitata 129
  nigridia 129
  puritana 129
  Pettitana 129
  rosaceana 51
  sulfureana 129
Tmetocera ocellana 51

Vanessa Antiopa 31
  Milbertii 31

Xanthia togata 120
Xylina Baileyi 120
  Bethunei 47, 50, 51
  capax 120
  cinerea 47
  conformis 96
  disposita 47, 51
  fagina 116
  ferrealis 47, 49, 120
  Georgii 120
  laticinerea 47, 50, 51, 97
  lepida 95, 120
  petulca 47, 51
  pexata 47, 49, 120
  querquera 120
  semiusta 120
  signosa 120
  tepida 120
  Thaxteri 95, 120
  unimoda 96, 120
  lambda v. rufescens 127
  lambda v. somniculosa 127
  lambda v. Thaxteri 127
  lambda v. Zinckenii 127
Xylomyges tabulata 120
Xyleutes crepera 134
  plagiatus 133
Xystus crepera 134

Zanclognatha lævigata 36
  marcidilinea 36, 48
  ochreipennis 36

NOTE ON THE GENUS PLUMALINA.

By JAMES HALL.

In the final publications of the Geological Survey of New York (Reports of the Third and Fourth Districts), Mr. Vanuxem, on page 175 of his report, figured a fossil consisting of a simple stipe or rachis, with narrow, linear pinnulæ arranged in rigid order upon each side; and on page 273 of the Report of the Fourth District, Mr. Hall gave a figure of a similar form, as a group or tuft of simple fronds, with the pinnulæ in a good state of preservation. Both authors expressed the opinion that the fossil was not a plant; though a comparison was made with FILICITES, and it was referred to FILICITES? in an explanation of figures in the Tables of Fossils, 4th District.

At a subsequent period, 1855, Dr. B. F. Shumard described and figured, as *Filicites gracilis*, a species congeneric with that of the New York Reports.*

In 1858, the writer, in a review of certain genera of the Graptolitidæ, proposed for the fossils here referred to, the generic name PLUMALINA, and *Plumalina plumaria* for the New York species, regarding it as the type of the genus,† and recognizing the species of Dr. Shumard as *P. gracilis*. The New York fossil has subsequently been described by Dr. Dawson as *Lycopodites Vanuxemi*.‡

Since that period other forms have come under the observation of the writer, to whom, at the present time, at least six species are known. These will be illustrated in a future report.

In all the species observed, the usual form is that of a simple frond, or hydrocaulus, with narrow, linear pinnulæ diverging from each side, essentially in the same plane, and more or less ascending. Rare examples are bifurcating or otherwise branching, and the specimen shown on plate 4, fig. 1, is the most remarkable example of this kind observed. Although usually occurring singly, it is evident from the figure given in the *Report of the Fourth Geological District*, as well as from other specimens known, that they may grow in tufts. No evidence of fertile cells or hydrothecæ has been seen, and no distinct serration of the pinnulæ can be made out in the specimens examined. From certain appearances upon some specimens, I infer that the pinnulæ were cylindrical, and probably tubular, their present appearance being due to extreme compression.

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* Report on the Geological Survey of Missouri: Part II, p. 208, pl. A, fig. 11. 1855.

† Canadian Naturalist and Geologist, vol. iii, p. 175. 1858.

‡ Quarterly Journ. Geolog. Soc., vol. xviii, p. 314. 1862.

From the general aspect of these fossils, they appear to be referable to the family PLUMULARIDÆ, and their forms and mode of growth may be compared with some species of PLUMULARIA and AGLAOPHENIA.

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